MARCH 21, 1946

THE

IRON AGE

Editorial Index, Page 37

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THIS WEEK IN THE

IRON AGE

Vol. 157, No. 12 March 21, 1946

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STEEL IS SHORT

but Ryerson Service Carries On!

Settlement of the steel strike last month was heartening to us all, but unfortunately it did not mean the immediate end of the steel shortage.

When peace came and the large ordnance uses for steel were no more, many thought there would be plenty of steel for every purpose. However, American industry converted so quickly to the manufacture of peacetime products that the pent-up need for steel became as great or perhaps even greater than war-time demand. Particularly was this true of the lighter flat rolled products.

Then, at the height of this unprecedented demand most all steel production was discontinued. As a result, no steel was received to replenish warehouse stocks while the strike was in progress. Ryerson lost tonnage fast. And, while there is still a good total tonnage on hand, we now have no inventory at all in many sizes of every product.

When steel mill facilities are closed down and the furnaces cool, much repairing is often necessary before operations can be resumed. So considerable time must elapse before mills can again run at capacity. We have large orders on the mill books and steel is already being received, but it will be some time before our stocks are again complete.

In the meantime, you may be very sure that our whole organization will do everything within its power to help every customer secure the steel necessary to his operations. Whatever you may need, or whatever your steel problem, we urge you to keep in touch with us.

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS: CHICAGO · MILWAUKEE · DETROIT · ST. LOUIS CINCINNATI · CLEVELAND · PITTSBURGH · PHILADELPHIA · BUFFALO · NEW YORK · BOSTON

THE
IRON AGE

ESTABLISHED 1855

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March 21, 1946

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One Law We Cannot Repeal

TODAY there are less than 2 million unemployed in this country of ours, not counting the volunteers. Throw them in too, the boys on the picket line, and still the total would be less than 3 million. Which means that a lot of people are at work.

Even in the most prosperous times in our history, this total represents a very low figure for unemployment. So a great many people must be busy in every category of production and service.

What are they doing? Producing less and less, according to the record. For production in America is dropping rapidly and has been since the termination of the war.

Something is wrong here very evidently. What is it?

Under ordinary circumstances, with today's productive setup, we should have a flood of goods and services unequaled in our history. Even in the war year of 1944, when probably 60 per cent of our productive effort was devoted to producing the materials of war, the War Production Board revealed that the remainder of this effort sufficed to produce peacetime products exceeding the total consumed by civilians in the prewar year of 1939.

These are plain unbiased facts. And in accordance with them it follows that our present day labor force should be producing from 40 to 50 pct more than at any time in our history.

Somebody or something is applying the brakes.

Why can't women get stockings?

Why can't men get undershirts?

Why can't returning soldiers get places to live?

Why can't people get sugar or butter?

Is it because of shortages due to the war? That might be the answer except for the fact that the war is over, that production is still dropping and all of this in the face of the greatest numerical or percentage employment, whichever you choose, in the history of America.

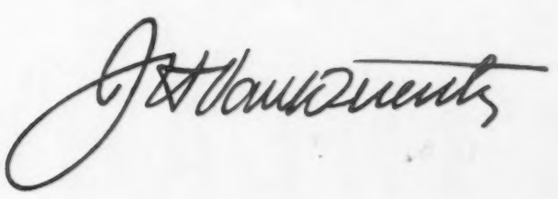
Wages are going up all over the country. Less and less goods are coming from our factories. What more ideal combination could you devise to feed inflation?

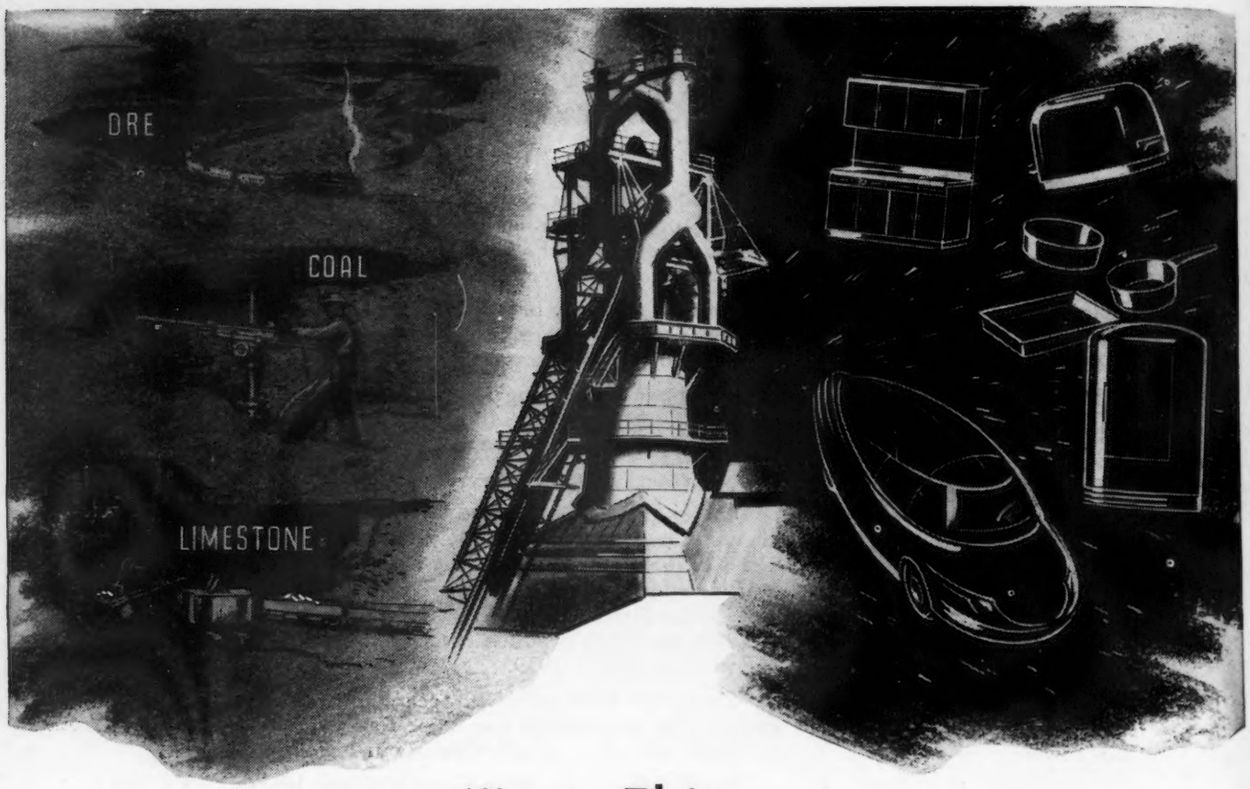
If you want a measure of inflation, consider the black market. Inflation breeds it. There never yet was a black market where productivity kept pace with purchasing power. Today, it is estimated that our black markets run as high as 50 pct of all consumer goods.

Some say this situation is due to strikes and labor unrest. Nonsense. Strikes are the result of inflation, not the cause of it. Labor does not want to be left behind in the procession of dwindling dollar values.

More and more production is the only cure for inflation. More and more production is the one remedy for the black market. More and more production is the one way to increase purchasing power soundly by making the dollar buy more.

And we won't have it until we release the brakes on productivity that have been set by the Washington bureaucracy that considers itself capable of repealing the age-old law of supply and demand and replacing it with OPA controls.





Finer Things Are Coming Out of the Ground

From the ore ranges, the coal fields, and the limestone beds are coming vast quantities of blended iron ore, coking coal, and purest limestone — the principal ingredients for making steel, the "master metal" of our industrial age.

These ingredients are stored in huge stock piles at the Inland docks. Daily, thousands of tons of coal are made into coke, and this coke, with iron ore and limestone, is charged into blast furnaces—the first step in making controlled quality steel—the first step in producing the finer things that come to us from out of the ground.

Inland metallurgists are constantly testing and re-testing, melting and re-melting, adding one element and taking away another—always seeking for something better. Already they have contributed many new methods and new steels to American industry.

These, and the newer Inland steels which are coming from continued intensive research, will help you meet the needs of America.

Principal Products: Bars, Floor Plate, Piling, Plates, Reinforcing Bars, Sheets, Strip, Structurals, Tin Plate, Rails, Track Accessories. INLAND STEEL COMPANY, 38 S. Dearborn St., Chicago 3, Ill. *Sales Offices:* Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis. St. Paul.

INLAND STEEL

THE IRON AGE
March 19, 1946

NEWSFRONT

► The first break in the accelerating rate of inflation is observed in the recent action of a ferroalloy producer in making a significant reduction in the prices of low carbon ferromanganese, used primarily for the production of stainless steels.

► British authorities have withdrawn their movie "The Foreman Goes to France" from Germany. Germans laughed in the wrong places and reacted unfavorably to scenes designed to arouse sympathy for Germany's victims.

One statement calling Germans "murderers" was always greeted with hilarious, sometimes almost hysterical laughter.

► A new type of coil spring for engine valves was found by a U. S. investigator in a German technical steel institute. Used in an automatic weapon, the spring was composed of five wires. One served as a central core around which were wound the other four wires.

The Germans claimed that this spring, using 20 pct less material than a solid wire spring of the same rate, had a 20 pct greater fatigue life.

► AMC Treatment R, developed for American Magnesium Corp., imparts a heavy oxide protective coating to magnesium alloys. This finish is produced by anodic oxidation of the article in a sodium hydroxide electrolyte followed by sealing in a chromate solution. Of high abrasion and corrosion resistance, the coating may also be colored with many of the organic dyes used for coloring oxide coatings on aluminum alloys.

► Lack of play between guide and bushing, which prolongs die life and increases production between grinds, has been promoted by a new style of die set in which precision antifriction bearings have been built into the guides.

► The recent tendency to increase the sulfur content of steel without any compensating increase in manganese, does improve machinability by increasing the number of longitudinal fibers of manganese sulfide, and the free iron is better broken up. However, it impairs the ability of steel to meet severe field service conditions.

Lead additions to steel also have serious drawbacks in that lead has a tendency to segregate and may bubble out in heat treatment or show voids in machined parts.

Better results are obtainable with additions of sodium bisulfite which form an envelope around nonmetallics thus eliminating their abrasive action on tool cutting edges. However, it does not lower ductility and is therefore not especially helpful for low carbon steels.

► By the time electrode coatings were introduced in Germany toward the end of the war, important alloys elements were not available and the lime-base coating type was introduced. Containing quartz, ferromanganese and ferrosilicon, poor physical properties of the welds were high, but difficulties encountered were melting rate, manipulation and extremely poor results when using ac. Furthermore, welding fumes were injurious to the health of the welders.

► German shipbuilding practice avoided welding in the shipyard in order to take ships off the ways as soon as possible. Shipyards became assembly plants for components built in a multitude of small plants and shops.

► Grinding fixtures and gages for circular form tools have reduced shutdowns for regrinding and increased tool life 2000 pct. Their use prevents burning of tools, permits more accurate rake angles and interchangeability of tools.

► France is applying extreme pressure to increase her allocations of metallurgical coal from the Ruhr. Recent press statements assert that Ruhr factories are re-opening in place of French factories in the same fashion as in 1919-20.

According to French accusations, the Ruhr has produced 4 million tons of coal this winter, and of this estimate France obtained 250,000 tons, while 2 million tons were going to the British zone of Germany.

► Tool factories in Sheffield, England, are rejoicing in the arrival of the first batch of men released on priority from the Armed Forces. Pressure for more releases is strong.

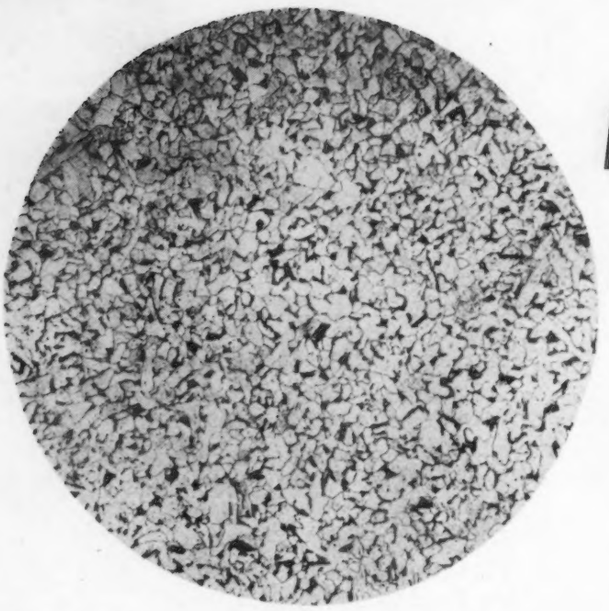


FIG. 1—Microstructure (100X) of the low-carbon steel shown in table I. Large light areas are ferrite, dark areas are pearlite.

Metallurgical Aspects

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By F. J. ROBBINS

Vice-President, Plomb Tool Co., Los Angeles

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IN any consideration of machinability the first task is to define the term. From a metallurgical standpoint, probably the most effective definition is that laid down by H. B. Knowlton:[1] "The most machinable steel is the one which will permit the fastest removal of the greatest amount of material (before resharpening the tool) with a satisfactory finish."

[1] *"Machining of Metals"—a symposium of five lectures presented to members of the ASM, Oct. 17-21, 1938, and subsequently published by the society.*

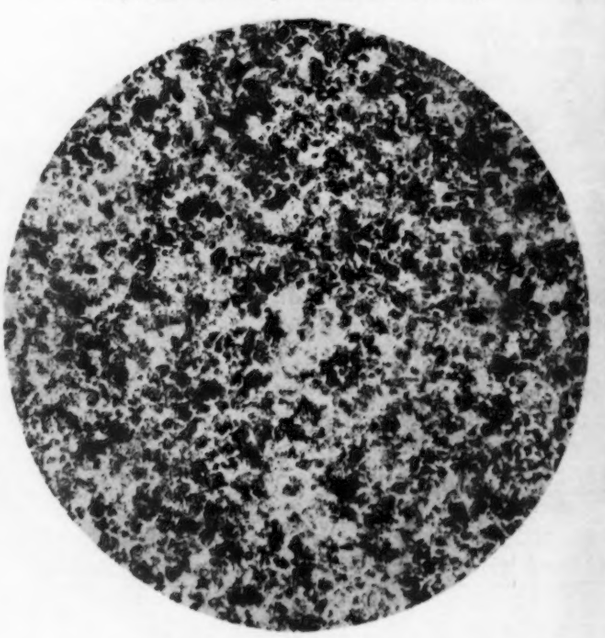
This definition covers a great deal of ground effectively but should be analyzed briefly before proceeding. In considering it metallurgically, and particularly in terms of the character of the steel involved, the best machining is obtained from a material possessing the following properties: low strength, low ductility, and low abrasive hardness. Low strength means low tool pressure to effect rupture of the cut chip from the work. Low ductility means the chip will break away from the work cleanly with a good finish on the part, rather than tear away with a consequent rough finish. Low abrasive hardness means the tool will stand up well without frequent resharpening; this makes for high machine efficiency through minimum downtime. These facts are now considered axiomatic.

In a metallurgical discussion of machinability, grades of steel commonly used, and possible improvements, it should be understood that steels generally do not possess, of themselves, the three properties that are desirable. Neither can they always be heat treated to produce these properties in the maximum degree.

Another axiom is that the selection of suitable raw materials to be used for a given steel part is, or should be, more dependent on field service requirements than on any other single factor; which may mean that if a steel, for instance, is potentially capable of high strength and high ductility after heat treatment, it probably cannot possess the required low strength and low ductility considered necessary to attain the desired good machining. Also, it can be seen that low strength and low ductility are in themselves opposites, in that soft, low strength materials automatically are tough, and high in ductility. Thus, the metallurgist must, in effect, arrange a series of compromises to attain the desired ends, namely, good field service and ease of fabrication.

The chemistry of the steel is important. As in all ferrous metallurgical matters, carbon plays a very important role. The typical low carbon, so-called mild openhearth steel, can usually be expected to fulfill two of the requirements set up. It is low in tensile strength and it can be made to be low in abrasive hardness, and generally is found to be so. It is naturally high in ductility. The ordinary low carbon, low-manganese openhearth steels can be expected to machine poorly, giving a rough torn chip and a ragged part finish. This is especially true of steel in the hot-rolled condition. If a means could be found to lower the ductility

FIG. 2—Microstructure (100X) of a steel with a higher carbon content, 0.30, showing the greatly increased amount of pearlite which improves the machinability.



# of Machinability . . .

Chemical composition of a steel is an important factor in controlling machinability, but microstructure is of even greater importance. In the first section of this two-part article, intended essentially for the layman, the effects of varying amounts of carbon, sulfur, manganese, lead, and sodium bisulfite are discussed with particular relation to their effect on microstructure and consequent effect on machinability.

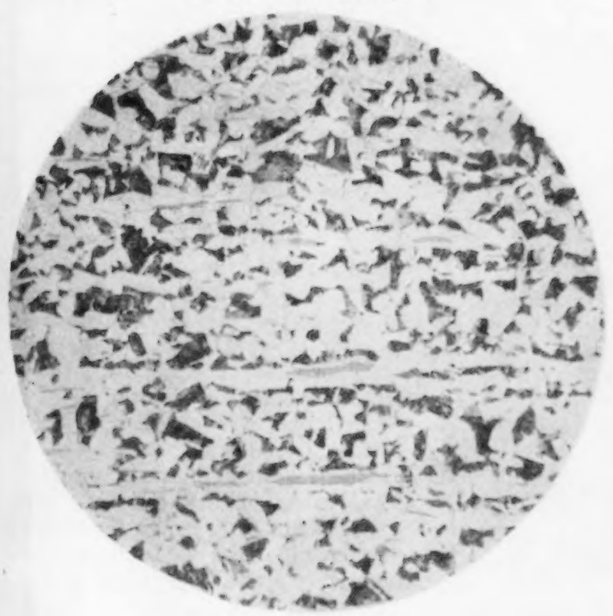
without raising the tensile strength too greatly, an improvement should result. This is accomplished when that same steel is cold-drawn.

Table I illustrates this by showing a comparison of the mechanical properties of a typical low-carbon steel of the indicated analysis as hot-rolled v. cold-drawn. The lowered ductility in itself produces an improvement in the machined finish of the part.

Another improvement in machinability can be made by the metallurgist in this steel, by an increase in the manganese content. Thus, by a slight increase in strength, a lower ductility is obtained even in the hot-rolled state. When this material is cold drawn a still further improvement occurs and machinability is improved. While other advantages of this manganese do result, especially in subsequent heat treatment, the primary consideration here is with machinability.

Increasing the carbon increases the strength and

FIG. 4—Openhearth steel (100X) of similar analysis to the bessemer, but with a higher manganese content. This is highly machinable, has good mechanical properties, and is intended to be carburized.



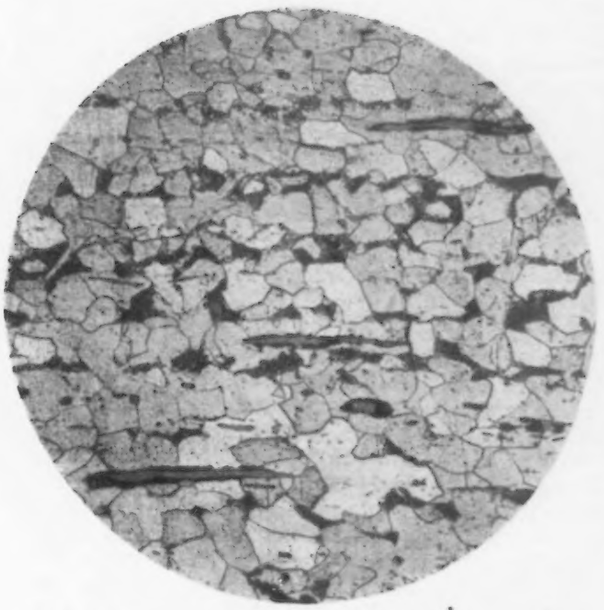


FIG. 3—Photomicrograph (100X) of a bessemer screw-stock steel. Note the streaks of manganese sulfide which improve machinability.

lowers the ductility, but has an even more important effect upon the microstructure. Microstructure is a factor in many ways even more important than chemistry in the machinability of steels.

Fig. 1 shows the microstructure of the low-carbon steel of table I. Note the large light areas which are iron, (ferrite, to the metallurgist). This is a soft, tough material, like rubber in some respects. It is low in strength and high in ductility. Note the dark areas called pearlite, alternating layers of ferrite and iron carbide. These are high in strength and low in ductility. Now, all other things being maintained constant, the proper proportion of these two constituents should produce optimum results. This is found to be the case, and an improvement in machinability results when the carbon is increased up to about 0.30 pct. Beyond this, the hardness and high strength begin to be a very potent factor operating against machinability, and some other means of control must be exercised.

Fig. 2 shows a steel of 0.30 carbon merely to illustrate the difference in structure from the low-carbon steel. The effect of this increase in carbon on the cutting is twofold. The soft iron areas are effectively broken up, and are further backed up by the harder constituent, making it possible for the tool to cut through them more easily. The second is the effect on the ductility, which is lowered because of the increase in this harder constituent. Thus, the chip is more crisp, breaks ahead of the tool, and gives better finish on the part.

In the straight-carbon steels such as have been discussed, the microstructure plays an increasingly important role as the carbon is increased. As the carbon content goes beyond 0.30, more and more of the dark constituent, pearlite, forms, and above about 0.45, the steel becomes hard enough to require a thermal treatment or anneal to bring the material to a machinable condition. Generally 300 Bhn is considered maximum hardness for production machining. Operations can be and are performed at higher hardnesses, but only

expensively and at relatively low production. More will be said about microstructure later, under alloys, but the remarks there are equally appropriate to straight-carbon steels above about 0.45 carbon, whether cold drawn or not.

Screw Stock Steels

At this point a group of steels known as screw stock enters the picture. These are materials deliberately made to machine readily at relatively high speed and feeds, with good tool life and finish.[2]

[2] *"Controlling Machinability of Screw Machine Stock,"* THE IRON AGE, *June* 8, 1944.

First, the bessemer screw stocks. By virtue of the method of manufacture they are high in phosphorus compared to the basic openhearth steel discussed thus far. Chemically, while the carbon is low, the phosphorus makes the steel more brittle and decreases the ductility. Also, they are high in dirt such as oxide. Further, fairly large amounts of sulfur are deliberately added. Because of some factors not entirely understood, these steels show a greater effect from cold drawing as is illustrated in table II showing analysis and mechanical properties of a typical bessemer steel hot-rolled v. cold-drawn. The net effect then is a steel of low strength but of lower ductility than the openhearth steels. When made to modern practice, it is maintained low in abrasive hardness.

Fig. 3 shows the microstructure of this steel. The dark streaks play a considerable part in making this steel machinable, too. They are composed of manganese sulfide, and are, in effect, chip breakers. They serve also to break up the continuity of the iron, and permit the tool to cut through it more easily. In this respect manganese sulfide is similar to pearlite. It does not, however, increase the strength of the steel as does pearlite, which is a decided advantage. One of the mechanical advantages of machining this steel is that the chips are finely broken up and do not clog the tool, the work, and the machine.

Other bessemer steels are available with less sulfur and relatively poorer machinability. It should be noticed at this point that some metallurgical disadvantages result from the factors just mentioned. The fibrous structure caused by the sulfide stringers, and the presence of oxides and other nonmetallics have a decided effect upon transverse strength. While the mechanical properties along the axis of the bar may be equal to the openhearth product of the same carbon content, the transverse properties are not nearly so good. Ductility and impact strength are also adversely affected, especially after heat treatment. The low carbon grades do not carburize uniformly, and are subject to soft spots and nonuniformity of hardness after quenching. This is caused by the usually high gas content.

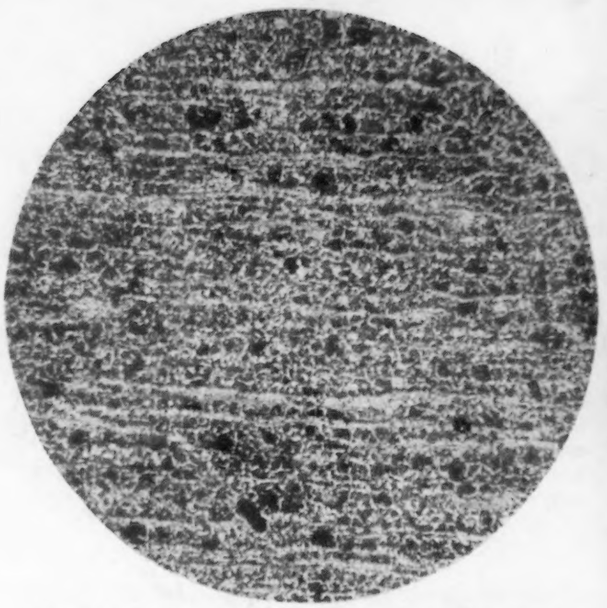


FIG. 5—Photomicrograph (100X) of a steel similar to that shown in fig. 4, but with a higher carbon content to produce required mechanical properties through a simple quench and draw.

Since the steel grades must be selected to be potentially capable of properties necessary to meet specified field service requirements, it is immediately obvious that bessemer screw stocks are limited to applications where the requirements are nominal in strength, and where no heat treatment is necessary. It is generally incapable of sustaining shock loads.

The machinability of bessemer was a fortuitous accident historically, and efforts to improve its cutting properties since then have not overcome the handicaps resulting from the method of manufacture. Openhearth steel, by virtue of its low phosphorus content and freedom from gaseous elements, is not subject to these detrimental factors. It does not, however, machine as well.

Many methods of improving the machinability of bessemer stock without losing its valuable characteristics have been tried with varying degrees of success. For instance, sulfur has been added and carbon increased slightly along with manganese. Essentially this is a mild openhearth steel with increased sulfur. Usually the sulfur maximum for this type of steel is maintained at about 0.15. The result is approximately a 20 pct increase over mild openhearth low-carbon steel but it does not machine as well as the bessemer product.

Another effort has been a duplication of analysis of the bessemer product but made in the openhearth. The results of this generally are not good, in that the product does not machine like bessemer to the same degree and still suffers a considerable loss in mechanical prop-

TABLE I

Typical Low-Carbon Steel, Hot Rolled and Cold Drawn

(AISI Grade C-1020)

Carbon	Manganese	Phosphorus	Sulfur
0.18 to 0.23	0.30 to 0.50	0.04 max	0.05 max

Physical Properties	Hot Rolled	Cold Drawn
Tensile strength, psi	55,000 to 70,000	61,000 to 82,000
Yield point, psi	25,000 to 38,000	45,000 to 65,000
Pct elongation in 2 in.	30 to 40	12 to 22
Pct reduction in area	50 to 65	35 to 55
Brinell hardness	114 to 143	128 to 166

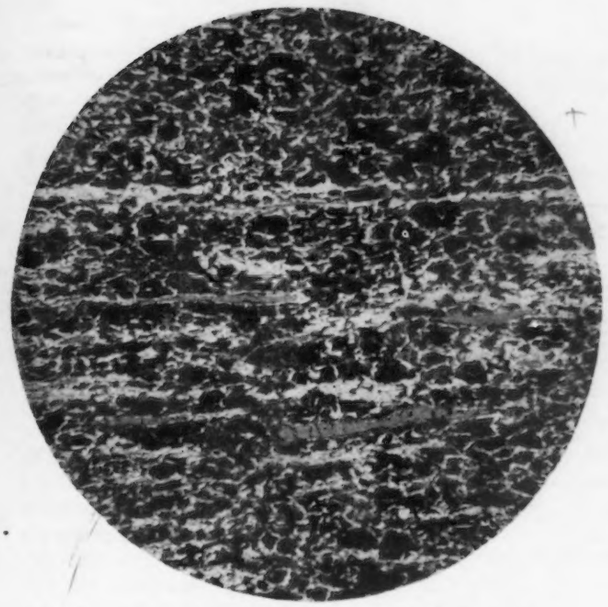


FIG. 6—Increasing the sulfur content to 0.30 improves machinability by increasing the number of manganese sulfide stringers, but adversely affects tensile and impact values.

erties, particularly after heat treatment.

Another group of openhearth steels produced for machinability have approximately the same range of sulfur, about 0.15 max, but with higher manganese, between 1.00 and 1.65 pct. This added manganese performs two functions, it combines with all the sulfur as manganese sulfide, and leaves some manganese at the higher range for alloying purposes. From this we obtain better machining properties and also improved mechanical properties. For years the steels most representative of this group, SAE X-1314 and X-1315, were all-around standbys where intricate machining operations were involved and field service requirements also were fairly severe.

Fig. 4 shows the microstructure of C-1118, the current designation for X-1315, which is low in carbon and intended to be case hardened.

There is in this steel enough carbon to provide some pearlite to break up the ferrite, and also some manganese to stiffen the structure and keep ductility at a lower level. Also, the manganese sulfide stringers break up the continuity and this serves as chip breakers.

This same type is made in higher carbon where a simple quench and draw provides the required mechanical properties through the section for various specified uses. Fig. 5 is such a steel. In this steel the carbon is high enough to provide good mechanical properties on a simple quench and draw. It does increase the strength materially, and interferes with machining, but the sulfur tends to offset this by breaking up the chip. Compared to a straight-carbon, low-sulfur steel of equal carbon content, this material will machine about 20 pct better and still give excellent field service results and good uniform heat treated hardness.

These are good steels, and represent very satisfactory compromises to effect the requirements of the original definition. Some sacrifice in mechanical properties results, but these steels will give good account of themselves both in field service and fabrication.

Effects of High Sulfur

In recent years an unfortunate tendency has developed to increase the sulfur content to higher and higher levels. This is done without any compensating increase in manganese, and is often accompanied by claims, imposing to the laymen but really ridiculous and unfounded, of special practices to maintain ductility and good heat treatability. They do machine better, simply because the actual number of longitudinal fibers of manganese sulfide is much greater and the free iron is better broken up. A well broken-up chip, and freer tool passage is obtained, but at the sacrifice of the steel's ability to meet severe field service conditions.

Fig. 6 shows such a steel of about 0.45 carbon and 0.30 sulfur. Note the sulfide as compared to the previous illustration.

These steels, however, must still be specified with an eye to field service requirements and, while it must be admitted that in many applications they are suitable, a good deal of caution must be exercised in their specification. They cannot show the same relative tensile strength and ductility as the lower sulfur varieties. As the sulfur increases it affects ductility and impact values adversely. While individual test results can be shown to refute this for sales purposes, the careful metallurgist will find, on more complete examination, that sulfur does have these effects. Fatigue and endurance will also show the effect of high sulfur, so that applications for these steels must be carefully considered.

Prior to the war lead was added to certain grades of steel.[3] This was taking a page out of the nonferrous book where lead is added to copper alloys to promote free machining. About 0.2 pct was added to certain openhearth screw stock analyses. The most outstanding results were shown in the low-carbon medium-sulfur types (about 0.20 carbon, 0.70-1.00 manganese, and 0.075-0.15 sulfur) where the lead and sulfur gave an apparently cumulative effect on machinability. The lead is present in the steel as very finely divided particles of metallic lead which serve to give a finely broken

[3] *"A Discussion of Leaded Steels," by F. J. Robbins and G. R. Caskey. Transactions of the ASM, Vol.* 28, 1940.

TABLE II

Typical Bessemer Steel, Hot Rolled and Cold Drawn

(AISI GRADE B-1113)

Carbon	Manganese	Phosphorus	Sulfur
0.08 to 0.13	0.70 to 1.00	0.07 to 0.11	0.24 to 0.33

Physical Properties	Hot Rolled	Cold Drawn
Tensile strength, psi	55,000 to 70,000	65,000 to 90,000
Yield point, psi	35,000 to 50,000	55,000 to 75,000
Pct elongation in 2 in.	25 to 40	10 to 20
Pct reduction in area	40 to 60	25 to 45
Brinell hardness	121 to 153	143 to 192

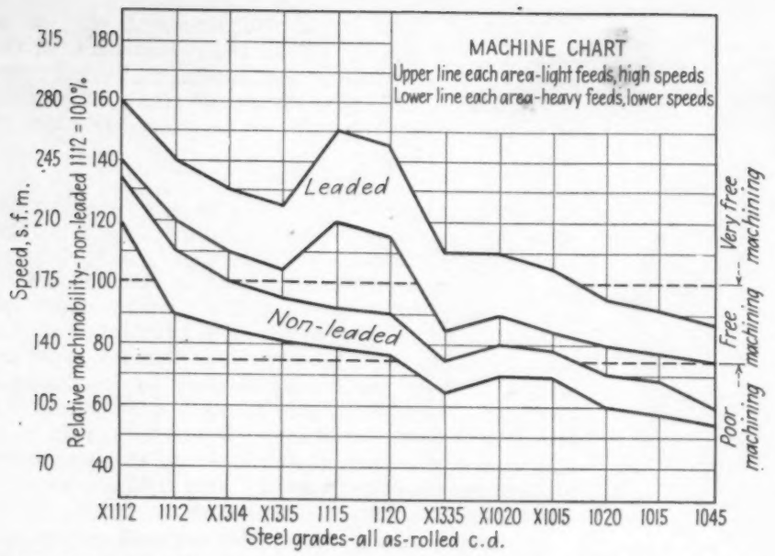


Fig. 7—Machinability chart showing the effects of lead on various grades of steel.

up chip, and in this way to enhance or add to the effect of sulfur. Some claim is also made of the lubricating effect of the lead on the tool. Certainly, the lead improves tool life and part finish as well as permitting increased speed and feeds, and thus gives greater production from equipment.

Fig. 7 shows a machine chart depicting the effect of lead on various grades of steel. This machine chart also shows relative machinability of other carbon grades. The lead being present in very finely divided particles, and forming no alloy or compound with the chemical constituents present in the steel, has no apparent effect on the mechanical properties. Thus, the addition of lead presumably increases machinability without detrimental effects.

Unfortunately, all is not perfection in lead additions. It is difficult to add because its boiling point is so close to the pouring temperatures of steel that a great deal of lead is lost into the atmosphere. These lead fumes are, of course, toxic, and special handling must be set up to prevent atmospheric contamination. Secondly, the lead has a severe tendency to segregation, and results in troubles from this in the finished parts, where it may bubble out in heat treatment or show voids in machined parts. The lead segregates in the bottom of the ingot, and sometimes even runs out of the stools, so that extra cropping is necessary. When the war began, even though leaded steel was eliminated from government specifications in the United States, it was retained in British and Canadian specifications, so that considerable experience was gained in its use. These problems have received wide attention and experience, so that now lead additions may be expected that will be both beneficial and suitable, without the disadvantages. The work that has been done has indicated that lead additions are most beneficial in resulfurized steels, but not particularly helpful in alloys. Lead has a tendency to duplex grain structure which is not good for steels intended to be heat treated, alloys particularly.

Another development is the use of sodium bisulfite. Originally it was added to the medium-carbon openhearth screw stocks with very good results. During the war this steel, so treated, was used in great quantities for 20-mm and 37-mm shells with considerable success in machining, since steel for this application was specified to rather high tensile and yield strengths. Particular claim for this process is that the bisulfite forms an envelope around nonmetallics such as oxides and silicates, and largely eliminates their abrasive action on tool cutting edges. This is fulfilling one requirement of the original definition, and is a step in the right direction. It also does nothing to increase strength, which again is in the right direction. It does not lower ductility, and is not especially helpful on low-carbon steels where high ductility interferes with good machinability.

Table III is a report of a test on a shaft made from C-1046, treated with sulfite, and the same steel not so treated. Note the tremendous increase in tool life. More will be said about this treatment in connection with alloys.

Note how each of these develop-

TABLE III

Test Report for Sulfite-Treated Steel Bolster Pivot Shaft

(Part of front wheel assembly for tractor)

Specification
C-1046, Sulfite-Treated
1¾-in. round

Operations and Results	Average Pieces per Grind Production	Sulfite Treated
(1) Operation 50: Lo Swing T.C. 3638, 78 rpm, 0.015-in. feed; continuous turn tools 1520-2144-1031-1107-6527-5270-5047-5048	8 to 10	35
(2) Operation 55: Gisholt Simplimatic T.C. 1373, 50 rpm, 0.011-in. feed; intermittent cut tool 5967	7	43
(3) Operation 80: Sundstrand Rigidmil T.C. 1497, 27 rpm, 3½-in. feed; mill cutter 8 in. with high-speed insert	40	80
(4) Operation 85: Baker four-spindle drill T.C. 5097, 300 rpm, 0.041-in. feed; drill four, 41/64-in. holes, 41/64-in. high-speed twist drills	25	55
(5) Operation 90: Hand mill T.C. 2055, hand feed No. 21 Woodruff keyway cutter	25	55

Increase in Tool Life

(1) Continuous turning	290 pct
(2) Intermittent turning	515 pct
(3) Milling flange	100 pct
(4) Drilling	120 pct
(5) Milling keyway	120 pct

Physical properties of the treated steel are equivalent to those of the regular steel. The fatigue tests, however, indicate that the sulfite treated shafts are more fatigue resistant than the regular shafts.

ments can be evaluated in the light of the original definition. In using it, however, it must be understood what characteristics each steel under consideration possesses, and what specific actions each additive agent possesses. In considering sulfur and phosphorus it can be seen why they are so helpful to low-carbon unalloyed bessemer steel. It can be seen why sulfur alone is helpful in openhearth screw stock; and, with an increase in carbon, the beneficial effects of that sulfur can be seen being counteracted by the increasing strength due to the carbon. It becomes evident also, why sulfur must be used cautiously in the light of the corollary on field service requirements. The same reasoning can be applied to lead and other agents which are being used.

In next week's issue, the effects of various alloying elements upon the machinability of steel will be discussed.—Ed.

Remote Control for Positioning and Indicating Equipment

ACCURATE dc positioning and indicating equipment which can be operated from any ac or dc line is announced by the Allis-Chalmers Mfg. Co., Milwaukee, for general industrial use wherever remote indication and control systems are employed.

The equipment, consisting of receivers and transmitters, is expected to have wide application for such uses as governor and generator field control systems for multiple synchronized diesel-electric drives, master remote control for reversing mill motors, and remote indication or control over mechanical, electrical, or hydraulic devices such as level, pressure, and flow indicators.

The receiver is a positioning unit in which the relative strength of the magnetic fields of the stator determines the position that its permanent magnet rotor will assume. Any change in the relationship of the field strength causes the rotor to turn and assume the position corresponding to the new resultant of the two fields. The receiver torque is a function of the displacement between the rotor and the magnetic axis of the receiver.

The transmitter, which is essentially a variable resistance bridge, operated manually or automatically, controls the relative strength of the receiver magnetic fields. Receiver and transmitter torques are independent, and the receiver torque required to move a device has no effect on the transmitter. The transmitter is designed to operate any number of receivers within rated capacity at any specified dc voltage.

Power requirements are essentially constant under all operating conditions, and overloading the receiver beyond its torque rating cannot damage receiver or transmitter. The equipment can be readily modified to operate at any desired dc voltage, or by the use of a small drip-type rectifier, can be operated on ac. Six sizes are available, ranging from 5 oz in. to 360 lb in. approximate pullout torque.

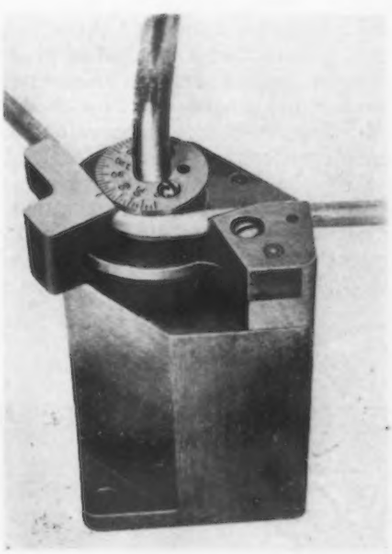
Simple Tube Bending Tool

A HAND bending tool, which permits all kinds of small tubing to be curved to any desired angle, has been developed at the Glenn L. Martin Co., Baltimore.

The new tool consists of a sturdy steel base which may be used in a vise or clamped to a bench; a revolving radius rod equipped with a handle for turning; a stop block grooved to hold the tubing; and a movable radius block which guides the tubing around a bend roll centered on top of the base. This roll, cylindrical in shape, and also grooved, has a top plate scribed in 360°. A measuring point is marked on the movable radius block. The radius and holding blocks and the roll are so grooved as to prevent crushing or change in section of the tubing.

In operation the tubing is inserted in the groove of the stop block and the movable block, which has been returned to the 0° point. The movable block is then pulled around the bend roll, being connected to the revolving radius rod, until the measuring point is directly opposite the mark of the angle in the bend roll.

By the simple substitution of a set of phenol fiber blocks, similar in design to the metal blocks, hot-dipped or tinned spiral high-electrical cables (for example, battery cables) also can be bent in the new tool. Use of the phenol fiber accessories prevent the semi-molten coating on the wire from adhering to the blocks, as would be the case with use of the steel blocks on the original tool.



Chief advantages of the new device lies in the great amount of time saved as compared to ordinary hand bending operations, the extreme accuracy to which the tubing can be turned and a material saving in that there is no scrap due to the tubing being crushed or split during the operation.

. . . A Protective Finish for

By R. B. MASON
Asst. Chief in Charge of Surface Treatment Section, Metallography Div., Aluminum Research Laboratories, New Kensington, Pa.

MAGNESIUM alloys require a protective finish for many applications. This finish is generally produced by a chemical or electrochemical treatment, followed by application of a suitable paint coating. In view of the many treatments which have been proposed for the protection of magnesium alloys, the prospective user may have difficulty in deciding which procedure is the most effective. The choice, however, will be influenced largely by service requirements since some of the treatments are effective only under specific conditions of service.

The procedures usually employed for coating magnesium articles involve a chemical reaction in solutions containing fluorides, phosphates, silicates or chromates or some combination of them. In general, the coatings formed by these treatments are very thin and are not particularly resistant to abrasion. Coatings of basic magnesium chromate or chromium chromate, however, provide good protection. The well known chrome-pickle or fluoride-dichromate treatments produce coatings of this character.

This article describes a method of producing relatively heavy protective coatings on magnesium alloys by electrochemical treatment. The treatment, designated AMC Treatment R, was developed for American Magnesium Corp., and has been used in Aluminum Research Laboratories for a number of years for the protection of magnesium alloys and as a base for paint coatings. This finish is produced by anodic oxidation of the article in a sodium hydroxide electrolyte followed by sealing in a chromate solution.

The use of an electrolyte containing sodium hydroxide for coating magnesium alloys is not new. It was the subject of a German patent to Völker[1] in 1934. More recently, an anodic oxidation process for protecting magnesium alloys and designated as CVAC No. 1 treatment was described.[2] With this latter process, an oxide coating is formed in an alkaline electrolyte containing sodium hydroxide with organic and inorganic additives. The resulting coatings are claimed to be among the better coatings for magnesium from the standpoint of protection of both unpainted and painted samples.

The coatings which are formed on magnesium alloys by certain electrolytic treatments are thicker and considerably more resistant to abrasion than coatings that are formed by simple chemical treatment. Further, the resistance of these oxide coatings to corrosion can be improved appreciably by the use of a final sealing treatment. For magnesium and magnesium alloys, therefore, coatings of this character are of considerable advantage where resistance to both abrasion and corrosion is essential

When magnesium is made the anode in a sodium hydroxide electrolyte, little current will flow at ordinary temperatures. Heating the electrolyte, however, causes a satisfactory current to flow at a relatively low voltage. Various additions may be made to the simple alkaline electrolyte but it is doubtful whether any advantage is gained except perhaps for slight changes in the operating conditions. In the electrolytic oxidation of magnesium, the coating that is formed has a slightly alkaline reaction, is somewhat soluble in water and is larger

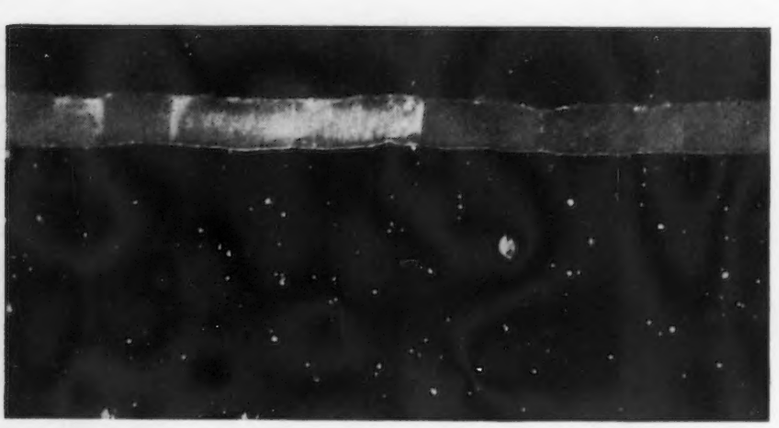


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FIG. 1—Cross section view (X500) showing appearance, thickness and uniformity of the oxide coating formed on AM-C52S alloy sheet by AMC Treatment R.

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Magnesium Alloys . . .

A protective finish which provides a heavy oxide coating with high abrasion and corrosion resistance is described in this article. The finish is produced by anodic oxidation of the magnesium alloy in a sodium hydroxide electrolyte followed by sealing in a chromate solution.

in volume than the volume of metal from which it is formed. The coating is considered to be essentially magnesium oxide but it may be somewhat hydrated.

In the anodic treatment of magnesium alloys, the condition of the surface of the article being treated is of much importance and has considerable influence on the voltage requirements and the resulting coating. The throwing power of the sodium hydroxide electrolyte is much less than that of the sulfuric acid electrolyte used for the Alumilite treatment of aluminum alloys. Consequently it is essential to have the surface of the magnesium alloy as clean as possible. Special cleaning procedures are necessary to accomplish this.

Ordinarily, most of the grease can be removed by treatment in a nearly boiling 5 to 10 pct sodium hydroxide solution or in a solution containing sodium carbonate and tri-sodium phosphate.[5] Following degreasing, an additional treatment of some type

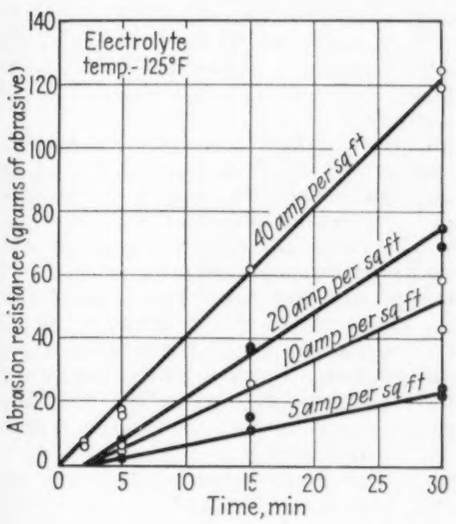

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FIG. 2 — Effect of time on the thickness of the oxide coating formed on AM3S-H and AM52S-H sheet.

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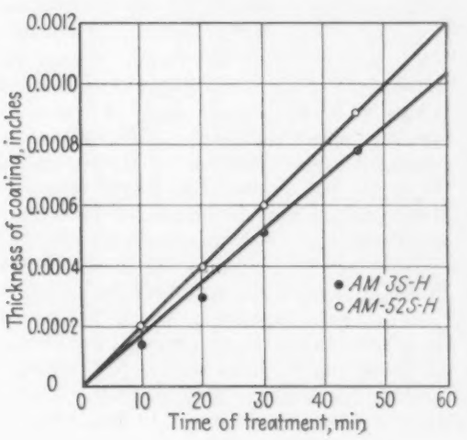

ABOVE

FIG. 3 — Effect of time and current density on abrasion resistance of coatings formed on AM52S-H sheet at an electrolyte temperature of 125° F.

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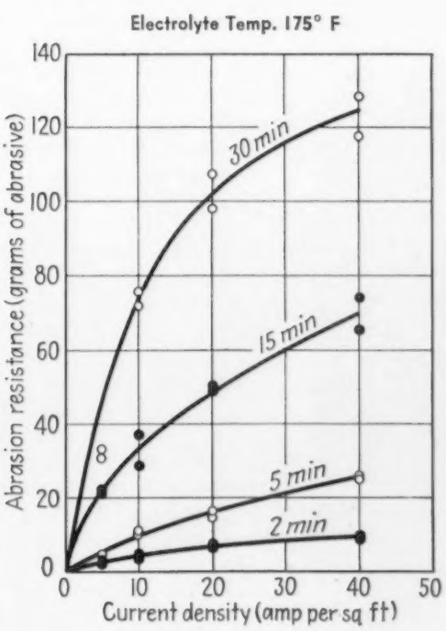
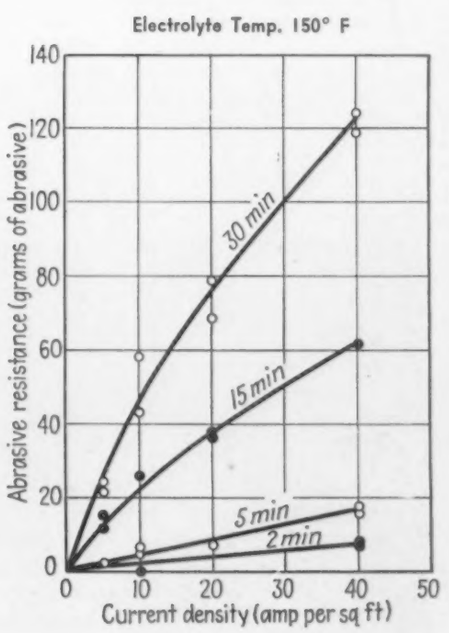
RIGHT

FIG. 4 — Effect of time and current density on the abrasion resistance of coatings formed on AM52S-H sheet at an electrolyte temperature of 150° F. (Right), 175° F. (left).





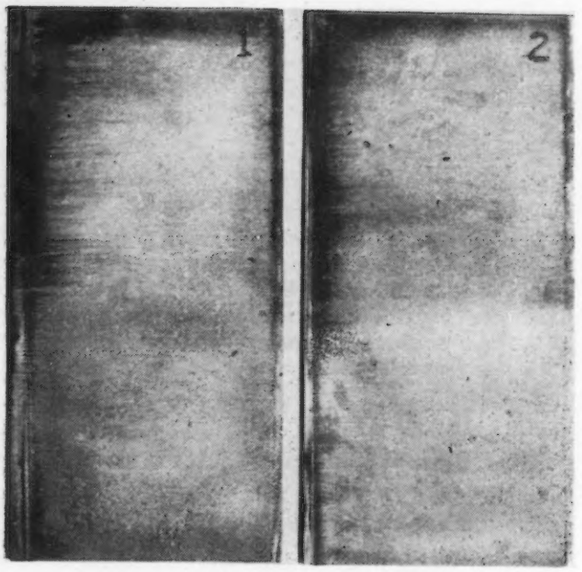
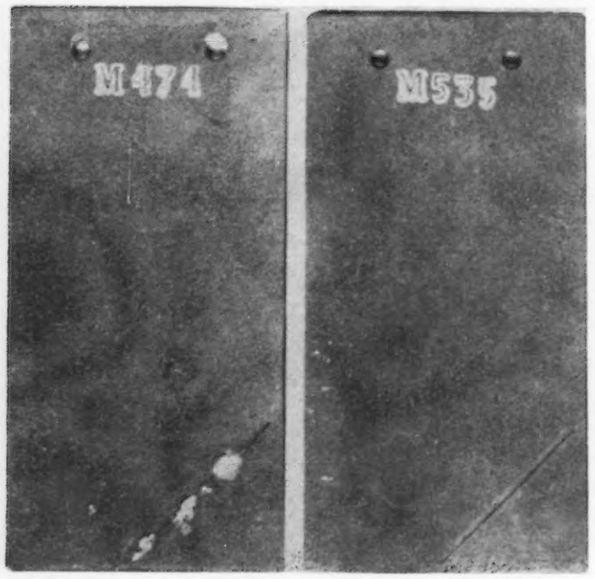


FIG. 5—Panels of AM265-T4 alloy, coated by AMC Treatment R and exposed to outdoor atmospheric conditions at New Kensington, Pa., for 3½ yr. Panel on left was not sealed; panel on right was sealed with sodium chromate. The bottom portions of these panels were cleaned after exposure.

should be used to remove heavy oxide films. This is usually accomplished by immersion in a chromic acid solution.[3] If the oxide coating is to be subsequently dyed, however, a 2 min etching treatment in a 20 pct ammonium chloride solution[4] at room temperature may be employed instead of the chromic acid solution. For magnesium castings that have not been machined, it may be desirable to use a nitric acid-sulfuric acid solution[5] to remove some of the surface skin rapidly before using either the chromic acid solution or the ammonium chloride etch.

American Magnesium Corp., Treatment R, for protecting magnesium and magnesium alloys, is applied in the following manner: The articles after being thoroughly cleaned by the procedures described above are connected as an anode in an electrolyte containing 5 pct sodium hydroxide and are treated for a period of 30 min with a current density of 12 to 18 amp per sq ft. Ordinarily, a potential of 4 to 5 v will be sufficient when the temperature of the electrolyte is between 140° and 160°F.

FIG. 6—AM265 alloy panels after 13 weeks exposure to outdoor alternate immersion tests. See Table I for surface treatment given these panels.



Good electrical contact is essential for consistent results. The use of high current densities will give rise to difficulties from poor contact. For making contacts, it has been found that clips of AM-C54S alloy sheet are somewhat more suitable than those made from other commercial magnesium alloys. This operating procedure will give good results for most of the wrought and cast magnesium alloys. The operating conditions, however, may vary slightly depending upon the type of alloy and kind of product.

After the electrolytic treatment, the coated article should be washed thoroughly in water and then sealed for 30 min in a sodium chromate solution which is maintained at a temperature of 170° to 180°F. Dichromates are not suitable for use in this sealing treatment since the magnesium oxide coating will be dissolved or disintegrated by an acid solution. Following the sealing treatment, the oxide coatings have a slightly yellowish color and are relatively smooth and hard. These coatings provide good protection against abrasive and corrosive action and serve very satisfactorily as a base for painting.

The oxide coatings on magnesium alloys differ from those produced on aluminum alloys by the Alumilite treatment in that boiling them in water does not seal the coating or prevent the absorption of organic dyes. The coating produced by AMC Treatment R can be colored with many of the organic dyes that are used for coloring oxide coatings on aluminum alloys. These colored coatings can be employed to advantage for any article of magnesium which is not subjected to corrosive conditions. The dyed magnesium oxide coatings, however, are not very resistant to fading under outdoor exposure.

The oxide coating formed on magnesium and magsium alloys by AMC Treatment R is relatively hard and smooth and is continuous and reasonably uniform in thickness. As with most coatings produced by an anodic oxidation process, characteristics such as porosity and uniformity will vary somewhat with the type of alloy, structure of the material and the conditions of thermal treatment. A typical example of the appearance, uniformity and continuity of an oxide coating formed on AM-C52S sheet by a 30 min treatment in a 5 pct sodium hydroxide electrolyte is illustrated by the cross section shown in fig. 1. This micrograph was made with dark field illumination at 500 magnification to show the features of the oxide coating to better advantage. In this example the coating is about 0.0006-in. thick and is very much thicker than the coatings which are ordinarily formed by chemical treatments. The coating on this sample was sealed in a sodium chromate solution. This sealing treatment tends to give a darker appearance to the oxide coating when viewed under the microscope.

The thickness of oxide coating obtained with this electrolytic treatment is dependent on both the time and the current density employed for the treatment. The effect of time of treatment is illustrated by fig. 2

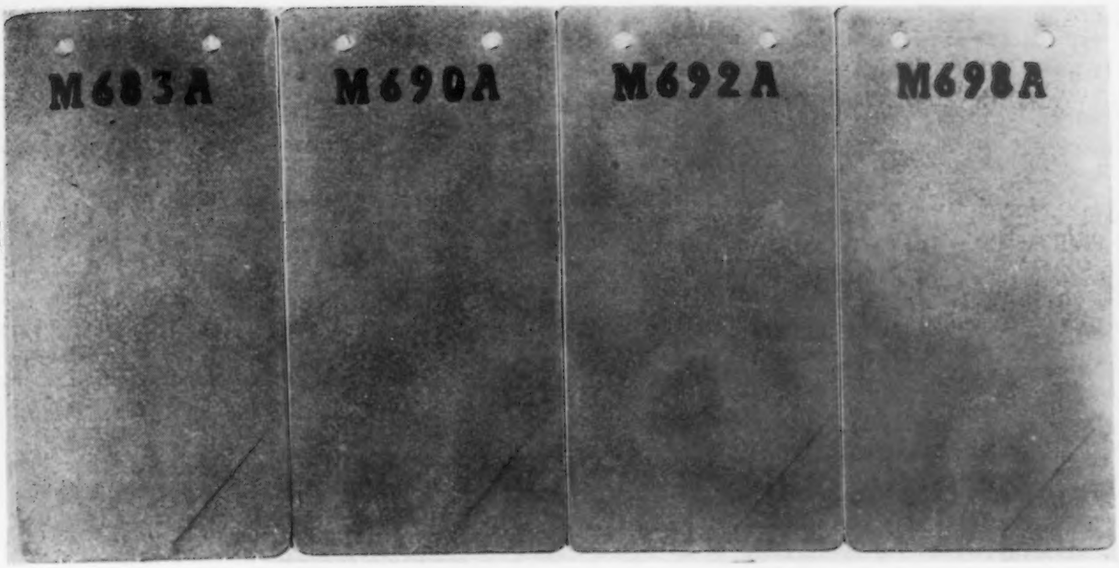


FIG. 7—AM-C52S and AM-C57S panels after 25 weeks' exposure to outdoor alternate immersion tests. Table I lists surface treatment given these panels before exposure.

which shows the results obtained on AM3S-H and AM52S-H sheet coated for various periods at a current density of 12 amp per sq ft. Ordinarily the 30 min treatment that is recommended will provide an oxide coating from 0.0005 to 0.0006 in. in thickness provided that the surfaces of the articles have been adequately cleaned prior to coating.

The effects of current density and temperature of the electrolyte on the abrasion resistance of the oxide coating are shown by figs. 3 and 4. It is evident from these results that the best resistance to abrasion is obtained when the high current densities are employed. These abrasion resistance measurements[5] were made on a blast-type abrasimeter which makes use of an accurately controlled abrasive blast to wear away a small portion of the coating. The

TABLE I

Exposure Tests of Coatings as Paint Bases on Magnesium Alloys

Panel No.	Surface Treatment*	Alloy	Length of Exposure, Weeks	Condition of Painted Panel
M474	AMC Treatment A (Chrome-pickle treatment applied by a 1 min dip in a solution containing 1.5 lb hydrated sodium dichromate and 1.5 pt concentrated nitric acid per gal.)	AM265	13†	Corrosion pitting along scratch and at corners; one small pit on face and a larger one on back; a few blisters on face and back.
M535	AMC Treatment R (Anodic coating in NaOH electrolyte.)	AM265	13	Very little attack in scratch; a few tiny blisters on back.
			30	Shallow corrosion along scratch and a few pits on edges; two small corroded spots on back with some paint blistering.
M668A	AMC Treatment A	AM265	18	Very little attack in scratch but a small corrosion pit on face.
M675A	AMC Treatment R	AM265	18	Slight blistering and corrosion in scratch.
M683A	AMC Treatment A	AM-C52S	25	Coating intact; excellent condition.
M690A	AMC Treatment R	AM-C52S	25	Very slight corrosion in scratch but otherwise intact.
M692A	AMC Treatment A	AM-C57S	25	Coating intact; excellent condition.
M698A	AMC Treatment R	AM-C57S	25	Very slight corrosion in scratch but otherwise intact.

* Panels M474 and M535 finished with Navy Aeronautical Specification P27B zinc chromate primer plus three coats Navy Engine Gray Enamel. All other panels finished with a 20 gal phenolic resin base zinc chromate primer plus three coats aluminum paint made with same vehicle.
† Panel discontinued after 13 weeks.

end point in the test is taken as the time when an electrical contact can be made in the abraded area.

Comparable tests with the chemical coatings could not be made because the coatings are so thin and the abrasion resistance so low that no significant values could be obtained. With the abrasimeter, a pressure of approximately 60 cm of water was employed when using an alundum abrasive in the 170 to 200 mesh range. It will be noted from figs. 2 to 4 that variations in the temperature of the electrolyte between 150° and 170°F have no appreciable effect on the abrasion resistance of the coating. When a lower temperature, 125°F, is involved, the abrasion resistance is somewhat less than that obtained for samples coated at the higher temperatures.

Coatings formed by AMC treatment R both with and without sealing treatments provide appreciable protection to magnesium alloys. This protection is demonstrated by an exposure test of AM265-T4 alloy castings for 3½ yr to outdoor atmosphere conditions at New Kensington, Pa. The castings were coated for 30 min at a current density of 18 amp per sq ft and a potential of 5 to 6 v. Some were left unsealed, others were sealed in a sodium chromate solution. The appearance of unsealed and sealed panels after exposure are shown by fig. 5. In this test the sealed coatings resisted atmosphere exposure better than the unsealed coatings but the latter did provide the panels with an appreciable degree of protection.

To evaluate the oxide coatings formed on magnesium alloys by AMC Treatment R as a base for paint, a number of magnesium alloy samples which had been coated by this procedure and then painted by two different paint systems were subjected for various periods to an accelerated exposure test. In both paint systems, zinc chromate primer was used as it has been found most satisfactory for magnesium alloys.[6]

The accelerated exposure test used has been described in detail by R. I. Wray.[6] Briefly, it consists of cycles of immersion in synthetic sea water combined with atmospheric exposure with the sample mounted, facing south, at 45° to the vertical. The samples that were tested are listed and evaluated in Table I. The appearance of panels after the exposure test is shown in fig. 6 and 7.

The results given in Table I are for alloy AM265 and for two wrought alloys AM-C52S and AM-C57S. The first two panels were prepared and tested in 1942, while, the other panels were tested in 1944. This, together with the fact that two paint systems are employed, may explain the slight differences in performance shown by the two tests. In both tests, however, the coatings formed by AMC Treatment R appeared to have afforded very adequate protection.

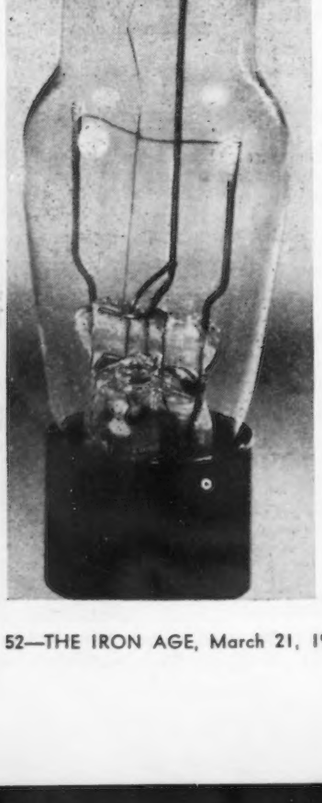
It is evident from the results that AMC Treatment R will provide magnesium alloys with a relatively heavy oxide coating that will have much better abrasion resistance than the best chemical coating now available and that will protect these alloys from corrosion at least as well if not better than the well known chrome pickle treatment.

References

[1] German Patent 594,062, March 9, 1934.
[2] "Anodic Process for Protecting Magnesium," by N. H. Simpson and Paul Cutter, Modern Metals, Vol. 1, No. 2, March, 1945.
[3] "Processes for Corrosion Protection of Magnesium Alloy," Army-Navy Aeronautical Specification AN-M-12, Sept. 16, 1943.
[4] U. S. Patent 2,383,702 to G. Elssner and E. Shroder. This patent is vested in Alien Property Custodian.
[5] Method of making abrasion tests was similar in principle to the method described in ASTM Standards, 1942, Part II, D658-42T.
[6] "Painting Magnesium Alloys," by R. I. Wray, Industrial and Engineering Chemistry, Vol. 33, July, 1941, p. 932.

Acknowledgment

The author acknowledges with thanks the data on abrasion tests supplied by R. Y. Barnes of the Castings Division, Aluminum Co. of America, Cleveland.



Gas Pressure Measuring Tube

A TUBE with a hot junction of a thermocouple element centered on a filament heater and designed to measure gas pressure changes through variations in thermal conductivity of the gas has been announced by Sylvania Electric Products Inc., Electronics Division, Boston. Used with a microammeter it will record pressures of 10^{-1} to 10^{-5} mm with plus or minus 5 pct accuracy.

Applications include laboratory use as a pressure gage and leak detector in evacuating apparatus.

Operated in a simple 3-v battery and resistance circuit, it may be sealed directly into evacuating apparatus by means of tabulation provided on top of the bulb. Direct measurement may be made with a 0 to 250 microammeter which may be calibrated for each gas measured. Maximum accuracy is assured by shielding the equipment from sources of radiant heat and air currents.

The tube, 4 7/16 in. long over pins and 1 9/16 in. max bulb diam, is supplied with small four-pin base and may be operated in any position. Maximum value electrical ratings are: filament resistance, 3.0 ohms; thermocouple resistance, 5.0 ohms; filament current, 125 milliamperes; and thermocouple current, 250 microamperes.

Antifriction Die Sets And Die Aligners

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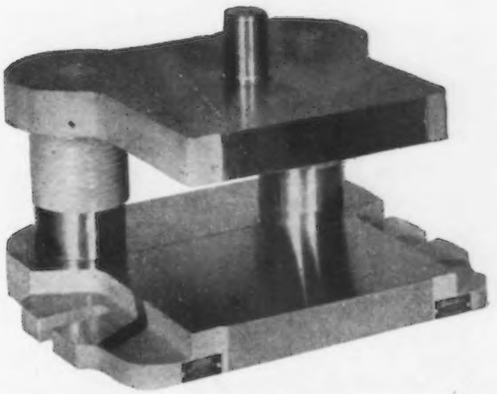


DIE set equipped with antifriction pins. Corrugated metal shields guard against the entry of chips and dirt into the bearings.

WEAR on guide pins has long been recognized as one of the principal causes of die failure, but until recently, there has been no way of overcoming this evil. Even with the most careful grinding and fitting, there is necessarily some slight amount of play between the pins and their bushings, and a costly set of dies may be ruined in the first few minutes of operation through a very slight error on the part of the setup man. Continued use, of course, tends to increase the amount of clearance, and necessitates a continually increasing amount of time and care at each setup.

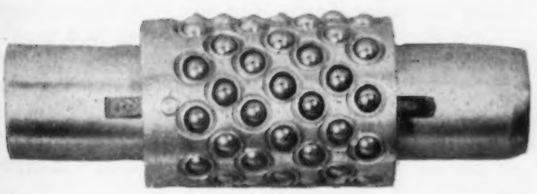
Recently, however, there has been introduced by Lempco Products, Inc., Bedford, Ohio, an entirely new style of die set in which precision antifriction bearings have been built into the guides. They are available with either square or round pins; in the former, roller bearings are employed, while in the latter, ball bearings are used. Special wear-resisting alloy steel is used for the pins, and these are hardened and precision ground.

At assembly, a preload of 0.0015 in. is set up in both styles of pins, but in spite of this there is no binding whatever, and it is not necessary to make use of jacks, pry bars, or similar tools when making a setup; dies may be opened and closed by hand with a minimum of effort. Test runs of 18 million strokes, made under unusually difficult conditions, have been made with production sets, and careful checks have shown that 0.0005-in. preload still remained. This is positive assurance of lack of play between guide and bushing, and naturally results in longer die life and greater production between grinds.

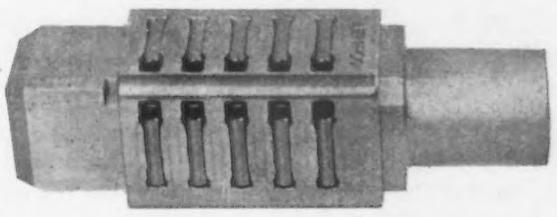
Both the punch holder and die holder are precision ground on both sides and are provided with unusually long gaging pads on the front edge. Shanks are solidly welded into place.

When the press itself begins to show signs of wear, a different problem is encountered, but this can now be overcome by the Lempco die aligner. The device consists of a pair of steel plates about 3/16 in. thick, ground flat on one side, and having a carefully matched spherical radius of 54 in. on the other side. A clearance hole for the punch holder shank is provided, and a number of additional holes are drilled through. The punch holder shank is ground down and fitted with a sleeve containing a ball joint. In use, the concave plate is placed on top of the punch holder, flat side down, and given a coat of very heavy oil; the second plate is then placed above this, flat side up. When the punch is placed in the press it automatically centers itself through the action of the ball swivel in the shank and the movement of the curved plates. A variation of this device employs only the convex ground plate, and in this case it is necessary to machine the top surface of the punch holder to an accurate 54-in. radius to match the plate.

Both these developments—the precision die set and the die aligner—are licensed under inventions of Guy Conner.



Special type of ball bearing employed on round guide pins.



For square pins, roller bearings are used.

. . . Wartime German Ship

• • • *Battered by her first encounter with the British fleet, the* Graf Spee, *one of the best known ships of the* Deutschland *class, proved the ability of welded construction to withstand severe punishment.*

THE great savings in weight, increased seaworthiness, and additional combat ability of welded ships of the *Deutschland* class, caused a constantly increasing application of arc welding in warship building in Germany; and during the last years of the war, in the construction of merchant ships. This trend was very decided, in spite of many failures caused by improper adaption of design to welding technique. Certain retrogressive developments, for example, in the ships of the so-called *Hansa* class, cannot be interpreted as departing from German appreciation of the advantage of welded ship construction, but were due primarily to a lack of welders and welding equipment.

The first article of this series, "Arc-Welding Trends in Wartime Germany," appeared in the Feb. 7, 1946 issue.

At the beginning of the war, in addition to plain-carbon steel designated in Germany as St. 42, which had a tensile strength of 60,000 psi, St. 52 (developed at first for bridge construction) was available for four alloy types which met German Navy specifications.

(1) Manganese steel with about 1.4 pct Mn.

(2) Silicon steel with about 0.9 pct Si and 0.8 pct Mn.

(3) Chrome-copper manganese steel with about 0.3 pct Cr and 0.5 pct Cu.

(4) Manganese-molybdenum steel with about 1.0 pct Mn and 0.1 pct Mo.

During the first years of the war, the scarcity of alloys in Germany forced standardization of the alloy types of manganese-silicon steel with less than 0.2 pct C, up to 1.2 pct Mn and up to 0.6 pct Si; in addition to this, either 0.2 pct Mn or 0.2 pct Si was allowed.

Due to failures in welded structures of large dimensions, such as bridges, before the war, extensive metallurgical and welding research was carried on, resulting in St. 52, which, with the addition of aluminum to the melt, produces a fine-grained steel that was found to be fairly satisfactory in construction and shipbuilding.

The question of the silicon content, which was held to a maximum of 0.8 pct, was answered by the fact that when silicon is higher than 0.8 pct, the danger of an increased number of silicate inclusions may result in porous or cracked welds. Even though it was proven by tests that steels with 0.95 pct Si, when accurately produced, could be welded safely with coated electrodes, in the last years of the war the Si content of St. 52 was limited to 0.65 pct when utilized in the construction of submarines. For submarine frames, which were bent cold and welded without being annealed, a notch-impact strength in the aged condition of about 30 ft lb Izod was required.

The shortage of manganese supplies in 1944 forced the limiting of the manganese content to 1.0 pct and 1.2 pct, according to the thickness of the plates, with the minimum yield strength lowered to 45,700 psi and 48,500 psi respectively. For pressure-hull vessels, in submarines, the composition of fine-grained St. 52, with 1.0 pct to 1.2 pct Mn, less than 0.23 pct C, and a minimum yield point of more than 48,000 lbs was kept. Large quantities of normalized St. 52 plates corresponding to the above specifications were welded without rejects by many plants in the steel construction industry.

Additional information on the effects of production conditions, especially of the effect of temperature, upon the nitrogen content of basic-bessemer steels, the

Welding

The types of steel allowed to be used for welded ship construction in Germany were strictly limited, and their composition was held to rigid specifications. Information as to the composition of these steels, as well as the composition of the electrodes and electrode coatings is given in this second of a series of three articles dealing with German welding practice.

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so-called air-refined substitute steels, was also found. This helped to make up for the lack of openhearth steels. For shipbuilding the following two killed basic-bessemer steels with a tensile strength of 60,000 to 71,500 psi were available.

C	Si	Mn	P	S	N_2
0.17	0.10	0.25	0.06	0.05	0.012
0.15	0.10	0.35	0.17	0.05	0.022

Insofar as the mechanical properties and weldability are concerned, the two steels correspond to the openhearth steel type St. 42, which was used extensively in shipbuilding. In experiments it was found to be not quite as susceptible to the effects of cold working as unkilled openhearth steel. Because of this, in 1944 the air-refined substitute steels were allowed to be used in submarine construction. Up to the middle of 1944, about 20,000 tons of air-refined substitute steels were produced for ships in the *Hansa* program. These ships were mainly of riveted construction, as has been previously mentioned, due to the lack of welders and welding equipment. Difficulties in joggling and flanging were found to be no greater than when openhearth steels were used.

Owing to the manifold demand of the shipbuilding industry, the development of welding rods was retarded by the lack of experimental facilities during the war. In the beginning of the war, bare electrodes or electrodes with a non metallic core were preferred. Only in the last years of the war were heavily-coated welding rods developed which fulfilled the demands of the shipbuilding industry. Comparative tests on butt joints, with high longitudinal stresses, showed that the welds made by non metallic core electrodes had a high degree of hardness in the deposited metal, and in the transition zone, which resulted in a lower tensile strength and elongation, than welds made with coated electrodes. These tests showed the superiority of coated electrodes in rigidly fixed butt welds. Due to these experiments the heavy coated rods were, in the last years of the war, used most extensively in ship construction in Germany.

The aim of German shipbuilding was to build as far as possible a structure of light construction, containing a high factor of safety, and low stresses. To obtain that result the German trend was to require detailed welding plans from the designer, which included specific design that would utilize welding to the utmost. Only then did they consider that welding in shipbuilding was economical. The entire ship was divided into subsections, which were welded in workshops, utilizing the existing equipment and cranes. Welding in the shipyard was avoided as much as possible. The cooperation of steel construction engineers and shipbuilders resulted in the ships being on the building ways for a much shorter period of time. In fact, the shipyards finally became mere assembly plants for components built in a multitude of small plants and shops. The welding processes used in German shipbuilding were further characterized by the increased application of semiautomatic and automatic welding machines. This includes equipment similar to the Unionmelt process.

During the war German producers of welding rods confined their development projects to the following main applications, with the exception of special purpose types:

(1) Welding of the usual structural steels.

(2) Welding of medium and high-tensile steels.

(3) Welding of medium-alloyed steels with special properties (Aircraft).

(4) Welding of stainless and heat-resisting steel.

(5) Hard facing electrodes.

Up to 1939, a simple bare wire, used only with dc and reverse polarity was common for construction welding when high quality was not required. That electrode contained about 0.10 pct C, 0.40 pct Mn max, 0.035 pct P and 0.035 pct S, with silicon in traces. This type of electrode was not developed further during the war.

For welding work in which lower values of strength, but good weldability with ac were required, lightly coated electrodes were used. The core corresponded with the bare electrode mentioned above, the coating constituents in general were iron oxide, and calcium carbonate. Sodium silicate was used as a binder and sometimes the coating contained small quantities of quartz. Small additions of ferromanganese were used to provide a sounder weld, and small amounts of potassium chromate were added to increase the stability of the arc, when using ac. When the electrodes were being dipped, potassium chromate prevented the ferromanganese from reacting with the silicious acid, and prevented the development of undesired gases. The thickness of the coating on this type electrode was not more than 15 pct of the diameter of the bare wire. Thin coated electrodes were generally used for unalloyed steels having a low carbon content. When used on this type work, the ultimate tensile strength was about 60,000 psi, with a minimum elongation and impact resistance.

Before the war, it is reported that an attempt was made in Germany to use lightly-coated electrodes on St. 52. The wire was supposed to contain about 1 pct manganese. Further development of this special type electrode was prevented by technical and war production difficulties. It was also found that a certain amount of danger existed in the use of lightly-coated electrodes on St. 52. The molten metal of the arc pool cooled very quickly, with the result that a brittle area developed in the heat-affected zone. This also prevented its use on unalloyed high-strength steels. The coating of this electrode was so light that proper gas-shielding substance could not be added, and no possibilities existed for the addition of appreciable amounts of deoxidizing mediums. In addition, excessive loss

of alloys, due to the arc, could not be compensated for. In general it may be said that lightly-coated electrodes did not have substantial development in Germany during the war. .

Some years before the war, a core-type electrode was developed in Germany. This electrode was primarily used for dc, but could also be used for ac when high current was employed. It gave very deep penetration, resulting in a weld that was not particularly subject to cracking, and in addition produced good appearance. This type electrode had an uncoated surface, but was filled with certain desired elements in the core center. The wire was alloyed with manganese, zirconium and aluminum. For general construction work that did not require exceptional physical values, a core-type electrode was in use that has a carbon content of about 0.10 pct and a manganese content of about 0.6 pct. It was used successfully in the welding of steel having a tensile strength of 60,000 psi. On a steel of this type it would develop the full strength of the base metal, having a elongation of 8 to 12 pct, and an impact resistance of approximately 18 lb Izod. Another core-type electrode was alloyed with nearly 0.18 pct C, 0.60 pct Si, 1.10 pct Mn and 0.35 pct Zr, with Al in minute amounts. This electrode had a melting rate much lower than the first, but with a definite advantage in that it could be used in much larger diameters. The weld was found to be free from porsity on heavy work. The electrode was easy to handle and especially practical in the welding of heavy plates. The physical properties of the deposit were as follows:

Yield point	54,000 psi
Tensile strength	65,000 psi
Elongation (2 in.)	18 to 20 pct
Impact resistance	28.9 ft lb

The welds made with above type electrodes were found to be free from red-shortness and were quite malleable.

For bridge, shipbuilding, and other heavy construction, St. 52, having a carbon content of not more than 0.43 pct and a manganese content of 1.2 pct, was used. There was developed another core-type electrode for the welding of different grades of St. 52, the chemical composition of which was 0.20 pct C, 0.25 pct Si, 1.60 pct Mn, 0.30 pct Ti, and 0.08 pct Al. Its melting rate was higher than Type 2, but its deposit was not as free from porosity when large size electrodes are used. The above three types of core electrodes could be used on unalloyed carbon steels if the carbon content were not greater than 0.45 pct and the thickness of the plates not over 5/16 in. The weld deposit of the third core-type electrode had the following physical properties:

Yield point	60,000 psi
Tensile strength	71,000 psi
Elongation	16 to 18 pct
Impact resistance	29.9 ft lb

The deposit of this electrode was also malleable and free from red-shortness.

A few years before the war, an attempt was made to develop a core-type electrode for high-speed welding. Good weldability and a considerable high melting rate was reached, but they did not succeed in securing deep penetration while retaining the above qualities. The development of core type electrodes to be used for ac also was halted by the war. The manganese content was limited to 1.50 pct, and Zr not being available, it was replaced by Ti.

For all high-quality welding, heavily coated electrodes were used. These were developed to a limited extent prior to the war, and in general, were similar to coated electrodes used in the United States. German producers chose the pressing method for their manufacturing procedures instead of the dipping process, and the machines required for this work were built by special factories, such as Sadowsky, Lange, Agil and Oerlikon. Before the war, producers of welding electrodes decided for themselves what type of wire for coated electrodes they would use. In wartime they were obliged to standardize on a minimum number.

In reference to the development of the heavy-coated electrodes, among the earliest to be studied in Germany were electrodes of a type called the Schnellschweib, or high-speed electrode. This electrode gave best results in fillet welds. It had a very high melting rate and produced a fine appearance. The main objection was the fact that it could be used only for unalloyed construction steel with a tensile strength of about 57,000 psi. In addition, it could only be used in the horizontal position. On steels having a higher tensile strength, the welds cracked because the weld absorbed oxygen out of the burning coating. The weld was not free from red-shortness. The losses of Mn and C in the deposit were also very high, and even Fe burned off to a certain extent. This was caused by the composition of the coating, which chiefly consisted of iron ores and asbestos. During the war these electrodes were used for electric-arc cutting only, and their manufacture was very limited.

Electrode Coatings

Experiments were carried on continuously in Germany to improve the quality of heavily coated electrodes. It was found that the best results were obtained by the use of the highest grade core wire available. The chemical composition of these electrodes was specified as follows: 0.08 pct C, 0.16 pct Si, 0.50 pct Mn, 0.70 pct P, and as little as possible of S. This was strictly adhered to even during the production difficulties of war. The new coatings still contained iron ores for arc stabilizers, which also increased the melting rate. The amounts of these constituents, however, was proportionately small compared with earlier type coatings. The old coating generally contained about 70 pct iron ore, compared to approx. 25 pct in the new types. Constituents were added in place of the iron ore that would give a protective gas shielding action around the arc, and at the same time deoxidizers were used to a greater extent than ever before. Ferromanganese was increased in the coating as much as 25 pct in some cases. Calcium carbonate, aluminum and magnesium silicates ionize the arc, and were used as slag forming constituents. For the same purpose rutil was also used. Before the war this was imported from South America. Rutil was used more and more in the production of coated welding electrodes, and it became the most essential constituent for many types of coatings. When Germany was isolated it was necessary to develop a substitute. This work was done by Farbenindustrie, which manufactured an artificial rutil out of ilmenite, found in Norway and having about 46 pct rutil. These artificial rutils were produced in different grades and produced excellent results in coating technique. The above electrodes were generally used with reverse polarity and were all-position rods. They could be used with ac with only fair results. All these rods can be classified as uni-

versal welding rods, with a few exceptions. A universal electrode in Germany is understood to be a welding rod that can be used on all simple unalloyed steels with a tensile strength from 48,000 to 74,000 psi. This takes in the German steels St. 34 and St. 37, and the shipbuilding steel St. 42 and St. 52. In addition the electrodes must be able to be used in the flat, horizontal, vertical and overhead positions in butt and fillet welds.

Experiments conducted in Germany to develop medium-coated electrodes, resulted in a coating containing about 40 to 50 pct rutil, chalk, and magnesium silicates, with sodium silicates as a binder. On this type electrode the thickness of the coating was not more than 40 pct of the diameter of the bare wire. The reason they were developed was to reduce the quantity of slag in overhead and vertical welding. Another advantage realized was the saving of the coating mass. On a physical test these electrodes passed all requirements, although not with such a high factor as the heavy coated types. The weld was more susceptible to cracks, and the appearance of the bead was rougher. In a fillet weld the first pass was of a convex nature, and rods of this type were efficient only in sizes smaller than ¼-in.

Late in the war, important constituents for coatings and alloying elements were not available in sufficient amounts, and it was necessary to limit the alloy contents both for the core wire and the coating. The manganese content of the best heavy-coated electrodes was established at 7 to 8.5 pct, dependent on the weight of the wire. About 50 pct of this manganese was required to be ferromanganese with 5 pct C. In the medium-coated electrodes the content of manganese in the coating was restricted to 2.2 pct.

Lime-Base Coatings

Towards the end of the war, the difficulty of securing enough of the desired alloys forced the introduction of another kind of electrode; namely, the lime-base coating type. This coating contained quartz, ferromanganese and ferrosilicon. The main difficulties encountered were: the manipulation of these heavy-coated electrodes, especially in large diameters; extremely poor results when using ac; and a very poor melting rate. Furthermore, the welding fumes were more injurious to the health of the welders. The physical properties of the finished welds, however, especially the elongation, were extremely high.

The requirements of the all-out war necessitated the control of all furnaces. The most important materials were melted in electric furnaces, and many steels, previously melted in electric furnaces, had to be processed in openhearth types. These measures also affected the manufacturing of welding electrodes, as the core wire used in their manufacture was in former times openhearth steel. Intensive experimental work and test showed that certain types of high-grade air-refined steel could be used as core wire and have all the properties necessary for good welding. There are no records available that show electrodes with this type core failing in greater percentage than regular type cores. This gives rise to the speculation that this type of steel may be used efficiently in peacetime.

Another case of fairly successful development was underwater welding, especially developed for ship repair work. For this purpose a special-purpose heavily coated electrode, with the coating protected by a varnish against the disturbing influences of the salt water, was produced. Experiments showed good results, but final development results could not be ascertained by the writer.

Austenitic electrodes for welding steels of what was considered in Germany to be a high manganese content were used quite successfully. For this purpose, coated electrodes with 25 pct Cr and 20 pct Ni, later with 18 pct Cr, 9 pct Ni and 6 pct Mn proved particularly good. During the course of many experiments an electrode consisting of a core of rim steel with about 0.70 pct C, 0.5 pct Mn, max 0.03 pct P and max 0.02 pct S with the basic coating mentioned previously was found useful.

Special Electrodes

Metallic-arc welding was seldom employed in the aircraft industry before the war, and the development of special welding rods for this purpose did not begin until the last two years of the war. The lack of tungsten prevented full development in Germany of the atomic process. This could not be substituted for by the use of the oxyacetylene method on heavy parts and difficult positions. In the early experiments it was found that for obtaining a tensile strength of 142,000 to 172,000 psi in the heat-treated weld metal, a core similar to aircraft metal containing 0.30 pct C, 2.5 pct Cr and 0.25 pct V was required. With the increased lack of alloys a switch over to a steel with 0.2 pct C and 2.0 pct Mn was made, which had been used previously for welding unheat-treated parts with a minimum tensile strength of 92,500 psi.

For welding of creep-resisting steels for boilers, electrodes were developed which corresponded with the chrome-vanadium and manganese-silicon steels brought out as base material for superheaters, drums and other parts of boilers and high temperatures pipe lines. At the end of the war the welding rods with the highest alloy content used in boiler construction had 0.15 pct C, 0.6 pct Cr and 0.3 pct V.

It had been stated by German technicians that no insurmountable problems were met in the procurement of materials for the core wire and coatings in aircraft, boilers, stainless and heat-resisting welding electrodes.

Hard-facing electrodes were used very advantageously since worn tools and equipment could be reclaimed by this method, with low consumption of materials and energy. Also, new products could be made with the materials saved. For hard-facing electrodes for common use, manganese and chrome-manganese steels 1.0 to 1.5 pct were developed, which were used without a coating. This was made practical on account of good deoxidizers contained in the core, consisting of approx. 0.2 pct Al and titanium. For the welding of dies, higher alloyed steels containing either 0.5 pct C, 0.7 pct Cr, 0.2 pct Mo and 1.6 pct Ni or with 0.3 pct C, 2.3 pct Cr, 0.65 pct V and 4.5 pct W were available. The coatings of these electrodes was basic. For surfacing tools which are made usually of high speed steels, welding rods of the same composition were used. The composition of these high-speed steels was usually 1.2 pct C, 4.0 pct Cr, 10.0 pct W and 4.3 pct V, or 1.1 pct C, 4.0 pct Cr, 2.4 pct Mo, 2.8 pct V and 2.4 pct W.

In addition to the above, Stellite types should be mentioned. Due to the fact that cobalt, chrome, and tungsten were very scarce, their use was restricted to seats, faces and stem ends of exhaust valves for aircraft engines. After a few small changes near the

end of the war the alloy contents for seats and faces were 1.7 pct C, 33 pct Co, 28 pct Cr and 6 pct W and for stem ends with 3.5 pct C and 32 pct Cr.

The development of stainless and heat-resisting welding electrodes in Germany followed the pattern of development of the base materials. Only well defined types of steels were allowed, and these were licensed only for certain necessary equipment and construction. The composition of the core wires and of the coatings were not changed to a marked extent during the war.

** The opinions and findings expressed in this article are the private findings and opinions of the author, and are not to be construed as the official opinions of the U. S. Army.—Ed.*

Fine Austenitic Grain Size Benefits Steel

EXTENSIVE research into the influence of the austenitic grain size upon the mechanical, physical, and technical properties of steel has been carried out in recent years. Although the problem has not yet been entirely solved, sufficient progress has been made to be of value in numerous cases as they occur in practice. In *Revue de Metallurgie*, vol. 41, 1944, G. Delbart and R. Potaszkim describe investigations made at the laboratories of the Société F.C.M., formerly Etablissements Cail, Denain, France.

Four heats were prepared in a Héroult electric furnace. Three of the heats were of low carbon content, while the fourth was a 0.4 C material. The austenitic grain size was determined in accordance with the MacQuaid-Ehn test, the results of which are given in the accompanying table.

Referring to the table, it will be seen that ladle additions of 0.24 to 1.15 kg of aluminum per ton resulted in a mixed grain size and normal structure. Increasing additions resulted in reduction in the size of both large and small grains and an increase in the relative amount of large grains present. Additions to the ingot mold as well as to the ladle resulted in a very fine grain of abnormal structure.

The test pieces of the low-carbon material (ingots B and D), which had been cast in rounds of 1.2 in. diameter and then forged into bars of 0.6 x 0.6 in. cross section, were partly annealed at 1652° F for half an hour followed by cooling in air, the balance being subjected to the same kind of anneal and then to heating at 1202° F for 2 hr with subsequent cooling in air. In the tensile test the fine-grained and the coarse-grained material in the annealed condition exhibited substantially identical tensile strength, the heat treated fine-grained material being slightly inferior in strength. But the elastic limit of the fine-grained material proved to be superior, irrespective of the heat treatment. In annealed condition elongation of the fine-grained material proved to be identical with that of the coarse-grained samples, while the heat treated fine-grained material gave a slightly higher elongation. With regard to the reduction of area, the fine-grained material was superior; but this superiority was more marked in the case of the heat treated samples.

Microscopic inspection revealed that the depth of penetration was virtually unaffected by the austenitic grain size. The depth of the hypereutectoid zone—after cooling the carburizing box and before heat treatment—was found to range from 0.028 to 0.032 in. in the case of normal depth of penetration, that is to say, 47 to 57 pct of the depth of case. In the pieces subjected to deep penetration, the hypereutectoid zone varied from 0.09 to 10.8 in., that is, 61 to 72 pct of the depth of case. After heat treatment the hypereutectoid zone was found to have disappeared.

It was found that carburizing time was without influence upon the number of soft spots. After quenching in tap water, soft spots were found to occur more or less in all steels excepting the 0.4 C material. Generally, the prevalence of soft spots was greater in the carburized fine-grained samples. Salt-water quenching was found to be a very efficacious means of suppressing the occurrence of soft spots even in very fine grain material.

Aluminum Additions vs Grain Size

Number of Heat	Ingot Mark	Aluminum Additions (g per ton)			Austenitic Grain Size			Structure
		Ladle	Mold	Total	ASTM Grain Size	Mean Surface in μ^2	Type of Grain	
0.10 pct Carbon Steel								
46,472	D	240	....	240	33% No. 1 + 67% Nos. 4-5	8000	1/3 very large + 2/3 medium	Normal
46,472	B	240	350	590	Nos. 7-8	600	Very small	Abnormal
46,475	C	530	....	530	47% No. 2 + 53% No. 5	7300	1/2 large + 1/2 medium	Normal
46,478	A	1150	....	1150	72% Nos. 2-3 + 28% Nos. 5-7	5000	5/7 large + 2/7 medium	Normal
0.40 pct Carbon Steel								
46,481	E	270	....	270	40% No. 2 + 60% No. 5	6000	2/3 large + 1/3 medium	Normal
46,481	F	270	250	520	No. 8	500	Very small	Abnormal

Grinding Gages For Circular Form Tools

By JOHN J. MEADOWS

ONE of the biggest obstacles to efficient production is the grinding of cutting surfaces on circular form tools. In many shops it is the practice to grind these off-hand, and most machine operators feel that they are fully capable of handling this supposedly simple job, completely failing to realize the amount of harm they may be doing to the tools.

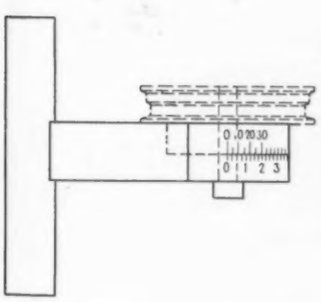
In one particular plant where a survey was being made of feeds and speeds in an effort to increase production, it was noticed that many of the circular form tools showed badly burned surfaces, and required frequent replacement. A grinding fixture and gage were therefore designed to determine the characteristics of the rake angles on the tools. A check showed that off-hand grinding had not only produced crooked cutting surfaces, but in some cases had produced negative rake angles of as much as 10°. In consequence, many tools were giving only 2½ hr or less between grinds, and it was necessary to remove as much as 3/16 in. to resharpen.

After the grinding fixture and gages were introduced, shutdowns for regrinding were reduced to a minimum, and the life of the tools was increased by 2000 pct by actual count, while performance was greatly improved. This system eliminated the burning of tools, produced accurate rake angles, and permitted interchangeability of tools. On test, these tools gave satisfactory performance for as long as 18 hr of continuous duty without undue damage. However, a policy of automatic replacement was established, and tools were changed automatically once each shift. This not only prevented shutdowns, but reduced to a minimum the amount of stock that had to be removed at each sharpening. In many cases the actual stock removal amounted to only 0.007 in.

The fixture and gages can be made locally, and consist of a grinding stand or fixture shaped like an inverted T, on which is provided a positioning disk for the tool to permit mounting in a manner similar to that employed on the production machine (see fig. 1). If it is desired to measure angles with the disk, it should be provided with seven holes, or a circular rack, depending on the holding method employed on the tool. If it is not desired to check angles with the fixture, one positioning hole only is required.

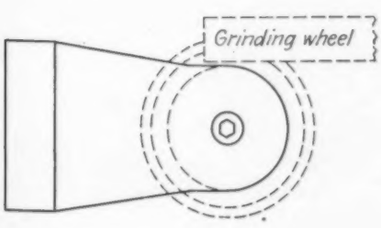
The vernier scale is used by differentially reading the scale for two positions of the tool, first with it set so that its cutting surface is in a horizontal position, and then rotated into its cutting position. The difference represents the rake angle.

The gages used with this fixture consist of a setting block, fig. 2, and a checking gage, fig. 3. The setting block is provided with steps on its upper surface, each corresponding with a particular rake angle, while mating surfaces are provided on the under side of the cantilever arm of the checking gage. Both block and gage are also provided with a step corresponding to the cutting position of the tool, and which may also



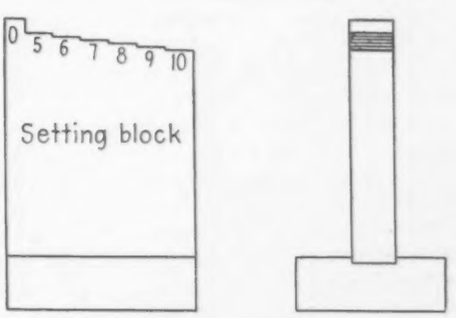
LEFT

FIG. 1—Grinding fixture for holding circular form tools on a surface grinder.



RIGHT

FIG. 2—Setting block used for positioning the grinding wheel to produce the required rake angle on the tool.



be used for grinding to zero rake when machining nonferrous materials. The gage should be made from nonmagnetic material so that it can be used on the magnetic chuck of the surface grinder while this is energized.

In use, the tool to be ground is placed on the fixture, and the positioning pin inserted in a convenient combination of holes. The setting block is then placed on the chuck of the grinder, with the wheel stationary. The wheel is then lowered on to the setting block until the surface of the wheel contacts the step corresponding to the rake angle desired. A reading is then taken of the scale on the handwheel controlling the vertical feed of the wheel. The wheel is then backed away from the setting block, and the scale reading noted as the goal to be approached in grinding the tool. The setting block is removed, and the grinding fixture is placed on the chuck. Using the checking gage, the tool is rotated until it contacts the step on the gage corresponding to the rake angle desired. It is then rotated slightly more to allow for grinding. As a guide, it might be noted that the distance between steps on the gage is approximately 0.025 in. Smaller amounts can be estimated.

The tool is locked in the position desired, and the chuck energized; the wheel is lowered into contact,

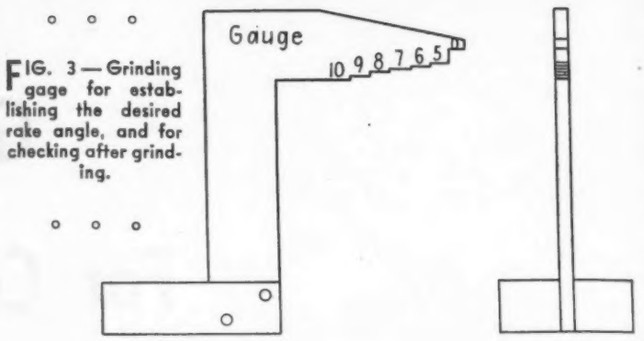


FIG. 3 — Grinding gage for establishing the desired rake angle, and for checking after grinding.

and grinding proceeds in passes of not more than 0.002 in. so as not to burn the tool. After the wheel has been lowered to the point corresponding to the reading originally taken on the handwheel, the gage is used to check the ground surface. This is to compensate for wheel wear. After the gage mates the ground surface, the tool can be removed. To check the rake angle it is necessary merely to rotate the tool while still in the fixture, so that the cutting edge contacts the cutting step provided on the gage.

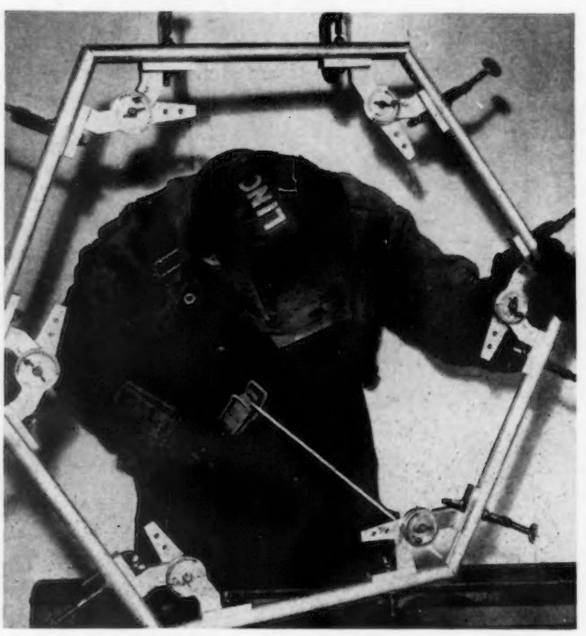
Work-Holding Clamp Saves Setup Time

DESIGNED to fill an urgent fabricating need, namely that of holding two parts in perfect alinement while welding, gluing, screwing, filing, or otherwise processing, a series of all-purpose clamps known as Duo-Square clamps has been introduced by the McFerron-Myers Products Co., Cleveland. They are made in three different sizes, with three styles in each size.

The straight style consists of a horseshoe-shaped bracket, carrying a tang by which the unit may be held in a vice, screwed to a bench, or attached to another unit. At each end of the bracket is an accurately machined work-holding plate, having a V groove running down its full length. The grooves are carefully aligned to assure true butt joints on the workpieces. A C-clamp is attached to each work plate in such a manner that it may be swung to either side of the bracket, and the clamp buttons are grooved to hold round and odd shapes.

The angular style is similar in construction, except that the two work plates are inclined to form a 90° included angle. The third style is adjustable, and features an accurately protracted dial by which the two work tables may be set to any desired included angle. The two parts are securely locked together by two setscrews, and are so designed that the V grooves are always in line. The accompanying illustration shows a hexagonal frame held together by six adjustable Duo-Square clamps for a welding operation.

USE of Duo-Square clamps for holding a hexagonal frame in alinement for welding is illustrated in this photograph. Design of the clamps permits accurate setting of the angles and effective clamping of the work piece to maintain this angle during the fabricating process.



Heat Treatment

Of High-Speed Steel

In the first three sections of this five-part article, the authors have presented a thorough resume of isothermal cooling and tempering of high-speed steels and an introduction to the concepts of tempering after arrested hardening. Tempering and the ramifications of interrupted cooling following tempering are explained in this, the fourth section, supplemented with data illustrating the improvement of physical properties obtained.

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Tempering After Arrested Hardening (Cont'd)

EFFECT of Tempering Time and Tempering Temeparture after Arrested Hardening—Figs. 29 and 30 reveal the effects of increasing the tempering time and tempering temperature after arrested hardening. The shape of the curve in fig. 29 indicates that tempering at 1050° F even for times far in excess of 10 hr does not cause all of the austenite to transform to martensite. Raising the tempering temperature, on the other hand, does rapidly decrease the amount of austenite left in the steel after tempering, but such tempering is accompanied by large decreases in hardness. For example, when the retained austenite is reduced to 2.5 pct by tempering, at 1250°F, the hardness drops to 53 Rc (fig. 30).

Thus, neither prolonged tempering at 1050° F nor tempering at still higher temperatures may be used in practice to overcome the adverse effects of arrested hardening.

Effect of Single, Double, and Multiple Tempering After Arrested Quenching—The data described thus far were based on single tempering; that is, the tempering treatments were carried out for the required length of time without intermediate coolings to room temperature. In normally hardened high-speed steel, there is practically no difference between single and repeated tempering in their effect on the rate of retained austenite decomposition. However, when the hardening quench is arrested **above** room temperature, a marked difference in the rate of austenite decomposition for single tempering and for repeated tempering becomes apparent. The data in table VII, illustrating this difference, represent the results of retained austenite and hardness determinations made on specimens cooled to a bath temperature of 225° F and then tempered directly at 1050° F as indicated. The single tempering data were obtained by making measurements on a series of specimens each tempered at 1050° F **once** for the indicated length of time. The double tempering data were secured by giving each of the single tempered specimens one subsequent heating at 1050° F for a period of time sufficient to make the total time at temperature equal to that of the next longer time indicated in table VII. (For example, the 6-min **single** tempered specimen was tempered once more for 9 min making its total **double** tempering time 15 min). For the multiple tempering data, the 6-min double tempered specimen was heated repeatedly at 1050° F for the appropriate increments of time to make the accumulated times comparable to the single and double tempering times. Examination of table VII demonstrates that either double or multiple tempering for a cumulative time of 2½ hr at 1050° F after quenching to 225° F results in essentially complete decomposition of the retained austenite. In other words, in spite of the large amount of austenite transferred to the tempering operation because of arrested hardening, virtually complete austenite transformation can be accomplished by tempering for 2½ hr at 1050° F if the tempering is carried out in two or more operations. Furthermore, such tempering entails no large loss in hardness, as is encountered in single tempering at higher temperatures.

The advantage of more than one tempering opera-

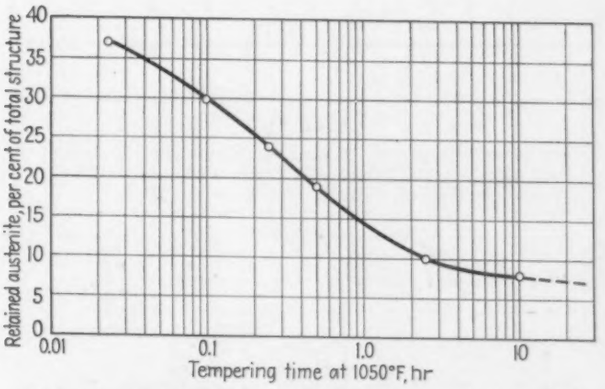


FIG. 29—Effect of tempering time on percent of retained austenite in W-Mo (6-5-4-1¾) high-speed steel quenched from 2225° F to 225° F and tempering directly at 1050° F (Gordon, Cohen, and Rose).[39]

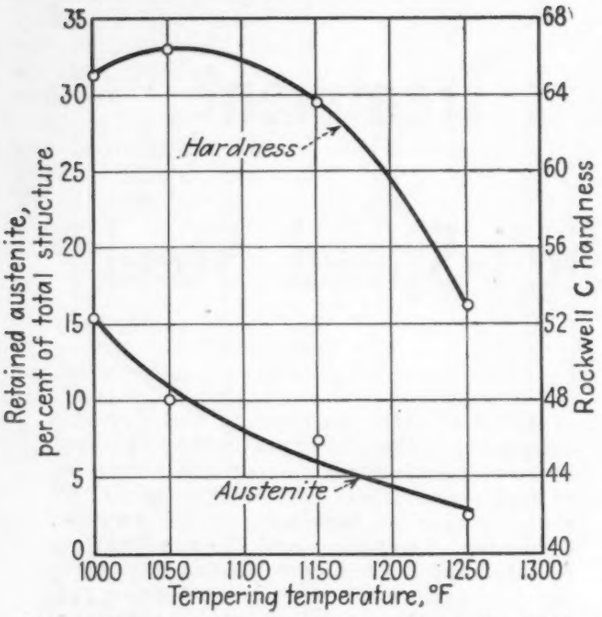


FIG. 30—Percent austenite and hardness after quenching W-Mo (6-5-4-1¾) high-speed steel from 2225° F to 225° F and tempering directly at indicated temperatures for 2½ hr (Gordon, Cohen, and Rose).[39]

tion after arrested hardening is strikingly illustrated by the transverse breaking strength data in table VIII. It is seen that after quenching to 225° F, subsequent double tempering causes a large improvement in strength over single tempering, but a triple temper provides even further benefit.

TABLE VII

Percent Austenite and Hardness for W-Mo (6-5-4-1¾) High-Speed Steel After Quenching from 2225°F to 225°F and Tempering at 1050°F

Total Time at 1050° F	Single Tempering		Double Tempering		Multiple Tempering	
	Pct Austenite	Rc Hardness	Pct Austenite	Rc Hardness	Pct Austenite	Rc Hardness
2 min	37	60.8	....	....	....	....
6 min	32	62.8	32	62.4	....	....
15 min	25	64.1	19	65.1	19	65.1
30 min	19	64.9	10	65.8	9	65.8
1 hr	15	66.0	4	66.2	2	66.4
2½ hr	10	66.3	2	65.8	0	65.7
5 hr	9	66.1	1	65.1	0	65.2
10 hr	8	66.0	0	64.6	0	64.0

TABLE VIII

Transverse Strength of W-Mo High-Speed Steel Quenched from 2225°F to 80°F and 225°F and Tempered in Single, Double and Triple Combinations at 1050°F

Designation	Quenching Bath Temperature, °F	Treatment at 1050° F		Modulus of Rupture, Psi	Percent Improvement Over Single Tempering
		No. of Tempers	Time, Hr		
1	225	1	2½	309,000	....
2	225	2	2½+2½	402,000	30
3	225	3	2½+2½+1	450,000	46
4	225	2	1+1½	377,000	22
5	225	3	1+1½+1	445,000	44
6	80	1	2½	434,000	....
7	80	2	2½+1	490,000	13

After the first temper of 2½ hr (table VIII, treatment 1), the steel contains about 43 pct (table V) of untempered martensite, and in addition is in a state of high internal strain as a result of the formation of the martensite on cooling. Both of these factors tend to detract from the strength. Consequently, the second heating (table VIII, treatment 2) raises the strength by toughening the untempered martensite and reducing the internal stresses. Moreover, the second temper achieves the decomposition of the final 10 pct of austenite (table V) not converted by the first temper. Therefore, a third heating (table VIII, treatment 3) is necessary to relieve the transformation stresses and toughen the last increment of martensite. This nicely explains the higher strength obtained after triple tempering (table VIII, treatment 3).

Thus it appears that multiple tempering does much to correct the adverse effect of arrested hardening on the strength properties. In fact, an improvement in strength of almost 50 pct is attained when the proper tempering practice is adopted instead of the single tempering. Stated briefly, when the quenching-bath temperature is sufficiently high so as to cause the transfer of large quantities of austenite to the tempering operation, a tempering temperature of 1050° F is quite satisfactory (just as after normal hardening), but the austenite cannot be adequately conditioned during a **single** temper to achieve its entire conversion on cooling back to room temperature. At the same time, during this cooling, a large amount of austenite does transform into untempered martensite with attendant stress-raising volume changes. While a second temper can "take care" of these detrimental factors, further austenite decomposition into untempered martensite results during the second cooling, and this makes a third heating desirable. If, as in the case of hardening to room temperature, the total austenite decomposition can be accomplished by a single tempering treatment, then, of course, no austenite is left to transform on cooling from the second temper, and a third operation becomes unnecessary.

Therefore, in selecting a combination of tempering cycles, two treatments should be used if the retained austenite can be substantially converted by the first temper, but if two cycles are required to achieve complete decomposition of the austenite (as is the case when the hardening quench is arrested appreciably above room temperature), then triple tempering is justified. However, the times selected are quite flexible. The triple temper corresponding to treatment 3 in table VIII (2½ + 2½ + 1 hr) involves an accumulated time of 6 hr at temperature. This time element may be materially reduced. For example, after cooling to a quenching-bath temperature of 225° F the retained austenite can be almost totally transformed by a double temper of 1 + 1½ hr. Then by applying a third temper of 1 hr for stress relieving and toughening purposes, one would expect quite satisfactory results even though this combination involves an effective tempering time of only 3½ hr instead of 6 hr. This prediction is substantiated by treatment 5 in table VIII which shows just about as much improvement over single tempering as does the longer treatment 3.

Despite the corrective action of multiple tempering when applied to steels whose hardening is arrested above room temperature, the fact still remains

that the highest strength values are secured when the quenching-bath temperature is as low as possible (treatment 7, table VIII). Nevertheless, wherever such low temperature cooling jeopardizes the steel because of possible cracking, arrested hardening may be safely employed in conjunction with multiple tempering with the assurance that very respectable strength properties will be attained.

Interrupted Cooling from Tempering Temp. General Considerations—The tempering of high-speed steel in ordinary commercial practice consists of heating to a temperature most commonly in the range 1000 to 1100° F, holding for an appropriate length of time, and then cooling in air. Almost invariably, the cooling is carried out continuously from the tempering temperature to room temperature. As previously pointed out, it is during this cooling operation that the bulk of the retained austenite transforms to martensite with its attendant stress-producing volume changes. Although such internal stresses can be appreciably relieved by a subsequent tempering treatment, there is, nevertheless, some danger of distortion of cracking of complicated tools when the volume changes are actually taking place during the cooling from the first tempering cycle, or even at room temperature before the second temper can be applied.

Transformation of the retained austenite can be accomplished, however, not only during continuous cooling from the tempering treatment but also by interrupting the cooling for a suitable time at a temperature within the range of 200 to 700° F.[20] As a result of the latter operation, the residual austenite transforms isothermally into a somewhat denser and softer, but notably tougher and more ductile product than the martensite formed during the usual practice of continuous cooling. In all probability this new product is bainite. Because the isothermal transformation produces a smaller volume change and because it occurs at a constant elevated temperature instead of during cooling, the resulting internal stresses are obviously lower than when the steel is cooled in the ordinary way. Consequently the likelihood of distortion, cracking and premature failure in service is minimized. Furthermore, the softer, tougher and more ductile nature of the isothermally-transformed steel might be expected to improve the service life of tools which are subjected to repeated impact. This is an important consideration because many high-speed tools fail by cracking or chipping in use rather than as a result of wear. However, it should be emphasized that very little information is available with regard to the practical benefits obtainable by this treatment in actual performance tests.

Interruption of Cooling at 500° F vs. Continuous Cooling—The optimum holding time and temperature for the interruption of the cooling from the temperature treatment depend on a number of factors such as the composition of the high-speed steel, the hardening conditions, and the tempering conditions. The time of holding may vary from a few minutes to 48 hr or even longer, and the temperature may be anywhere within the range of 200 to 700° F. For practical operation, a more precise determination of the time and temperature of the interruption is desirable.

A valuable rule for the determination of the holding temperature in any particular instance is that

TABLE IX

Effect of Hardening Temperature on Isothermal Transformation after Tempering (18-4-1)

Hardening Temp., °F	Tempering Temp., °F	Tempering Time, Hr	Optimum Isothermal Transformation Temp., °F
2300	1050	2½	510
2350	1050	2½	500
2400	1050	2½	450

TABLE X

Effect of Tempering Temperature on Isothermal Transformation after Tempering (18-4-1)

Hardening Temp., °F	Tempering Temp., °F	Tempering Time, Hr	Optimum Isothermal Transformation Temp., °F
2350	1000	2½	250
2350	1050	2½	500

TABLE XI

Effect of Tempering Time on Isothermal Transformation after Tempering (18-4-1)

Hardening Temp., °F	Tempering Temp., °F	Tempering Time, Hr	Optimum Isothermal Transformation Temp., °F
2350	1050	1	375
2350	1050	2½	500
2350	1050	5	530

TABLE XII

Comparison of Strength Properties in 18-4-1 High-Speed Steel after Continuous Cooling and after Interrupted Cooling from the Tempering Temperature

Austenitizing Temperature = 2350° F[22]

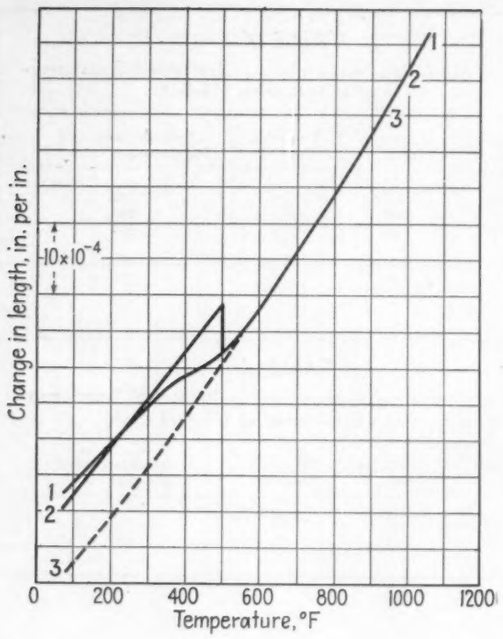
Designation	Properties	Cooled in Air to Room Temp. (usual practice)	Cooling Held at 400° F for 20 Hr
a	Rockwell C Hardness	65	64
b	Modulus of rupture in bending, Psi	408,000	450,000
c	Maximum permanent set before breaking in bending, Pct	0.07	0.15
d	Modulus of rupture in torsion, Psi	310,000	346,000
e	Angle of twist before breaking in torsion, degrees	80	115
f	Resistance to torsional impact, ft-lb	48	109

TABLE XIII

Improvement of Torsion Properties in 18-4-1 High-Speed Steel Achieved by Interrupted Cooling from the Tempering Temperature[22]

Austenitizing Temperature = 2400° F

Tempering Treatment	Modulus of Rupture, Psi	Ultimate Twist Degrees
2½ hr at 1050 ° F, continuous cooling in air to room temp.	256,000	65
2½ hr at 1050° F, cooling interrupted at 400° F for 20 hr	351,000	127
2½ hr at 1050° F, continuous cooling in air to room temp., retempered 20 hr at 400° F.	288,000	67



LEFT

FIG. 31 — Dilation curves showing continuous cooling from the tempering temperature vs. interrupted cooling for 18-4-1 high speed steel hardened at 2350° F and tempered 2½ hr at 1050° F (Cohen)[20].

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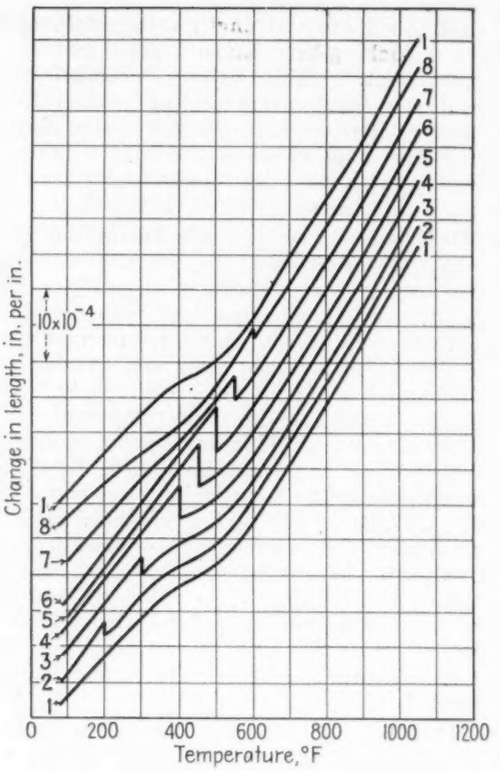
RIGHT

FIG. 32 — Dilation curves showing the effect of interrupting the cooling from the tempering treatment at different temperatures. 18-4-1 high speed steel hardened at 2350° F and tempered 2½ hr at 1050° F. Holding time = 24 hr (Cohen)[20].



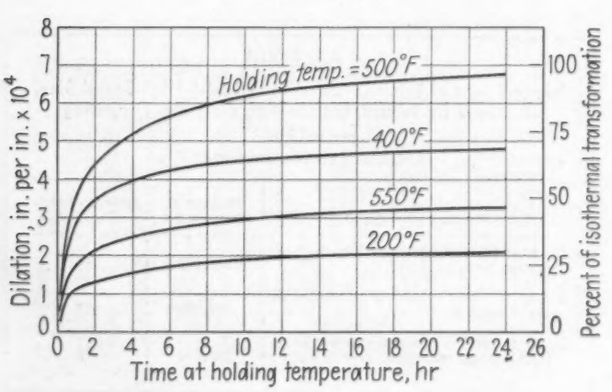
it should be slightly below the temperature at which the residual austenite begins to transform during continuous cooling from the tempering temperature. This point readily may be determined by cooling hardened and tempered specimens of the high-speed steel to be treated in a dilatometer so that changes in length during the cooling can be measured. A plotting of the readings gives results of which those in fig. 31 are typical. The curves in fig. 31 are for 18-4-1 high-speed steel hardened at 2350° F and tempered at 1050° F. Curve 1 represents the change in length of a sample during continuous cooling after a tempering treatment of 2½ hr at 1050° F, curve 2 the change in length of a sample during interrupted cooling after a similar tempering treatment, and curve 3 the change in length during cooling of a sample held at 1050° F for only a very short period of time so that no austenite decomposition takes place during the cooling. It is seen that the continuous cooling curve 1 coincides with the interrupted cooling curve 2, and with curve 3, down to the holding temperature of 500° F. From this point downward, curve 1 bends leftward and ends at a point slightly above the end point of curve 2. That is to say, the final length of the continuously cooled sample is greater than that of the sample which has been subjected to interrupted cooling, and both final lengths are considerably greater than that of sample 3. The expansion due to residual austenite transformation, therefore, is greater in the case of the continuously cooled sample than in the case of the sample subjected to interrupted cooling. Curve 2 shows that when the cooling of the sample is interrupted at 500° F, this transformation of residual austenite causes an isothermal increase in the length of the sample following which the cooling curve proceeds as a substantially straight line. This means that no transformation occurs during the cooling from the holding temperature, whereas during continuous cooling from the tempering temperature the transformation extends almost down to room temperature.

[20] *Cohen, Morris, "Heat Treatment of High-Speed Steels," U. S. Patent No. 2,265,973, Dec. 9, 1941.*

[21] *Pope, R. L., "Isothermal Transformation of Residual Austenite in High-Speed Steel," M.S. Thesis, M.I.T., 1940.*

[22] *Peterson, R. E., "Effects of Isothermal Transformation of Residual Austenite on the Properties of High Speed Steel," M.S. Thesis, M.I.T., 1942.*

FIG. 33—Isothermal transformation as a function of time of holding during interrupted cooling from the tempering temperature. 18-4-1 high speed steel hardened at 2350° F and tempered 2½ hr at 1050° F (Pope)[21]



Interruption of Cooling at Different Temperatures—Fig. 32 shows the effect of interrupting the cooling of 18-4-1 high-speed steel hardened at 2350° F and tempered 2½ hr at 1050° F, at different temperatures. Curve 1 is the continuous cooling curve, and curves 2 to 8 inclusive show the interruption of the cooling at 200, 300, 400, 450, 500, 550, and 600° F, respectively. The time of holding in each instance was 24 hr. These curves show that the extent of isothermal transformation of the residual austenite varies with the holding temperature and that the optimum temperature in this case is at about 500° F

which, as pointed out previously, is slightly below the temperature at which the transformation begins during continuous cooling.

If the cooling from the tempering temperature is stopped at a temperature above the optimum, only a part of the residual austenite transforms isothermally and the remainder transforms during the subsequent cooling to room temperature. On the other hand, if the cooling is interrupted at a temperature below the optimum, again only a part of the residual austenite transforms isothermally, the remainder having transformed during the cooling before the interruption. In either event the maximum effect of isothermal transformation is not obtained.

Effect of Hardening and Tempering Temperature and Tempering Time—The optimum holding temperature depends principally upon the composition of the steel, the hardening temperature and the tempering temperature and time. These effects are illustrated by the data in tables IX, X, and XI which are the results of tests carried out on samples of 18-4-1 high-speed steel.[21] It is evident that for a given high-speed steel composition, the optimum isothermal transformation temperature increases as the hardening temperature is lowered. The optimum isothermal transformation temperature also increases, the higher the tempering temperature and the longer the time. In other words, the less stable the retained austenite, whether by restricted carbide solution during austenitizing or by extensive carbide precipitation during tempering, the higher will be the optimum isothermal transformation temperature after tempering.

Effect of Time at Holding Temperature—The role of time at the holding temperature during interrupted cooling from the tempering temperature is shown in fig. 33,[21] which represents the isothermal expansion as a function of time due to isothermal transformation of residual austenite at 200, 400, 500, and 550° F on samples of 18-4-1 high-speed steel hardened at 2350° F and tempered at 1050° F for 2½ hr.

As appears from fig. 33, the isothermal transformation is practically complete at the optimum temperature in 24 hr. However for some grades of high-speed steel 36 to 48 hr may be required for substantially complete isothermal transformation at the optimum holding temperature. It is of course, not necessary to design the interrupted cooling treatment for a complete isothermal transformation of the retained austenite. For instance, an interruption of only 1 hr at 500° F allows 50 pct of the residual austenite to transform isothermally, and a 4-hr hold accomplishes 75 pct of the transformation.

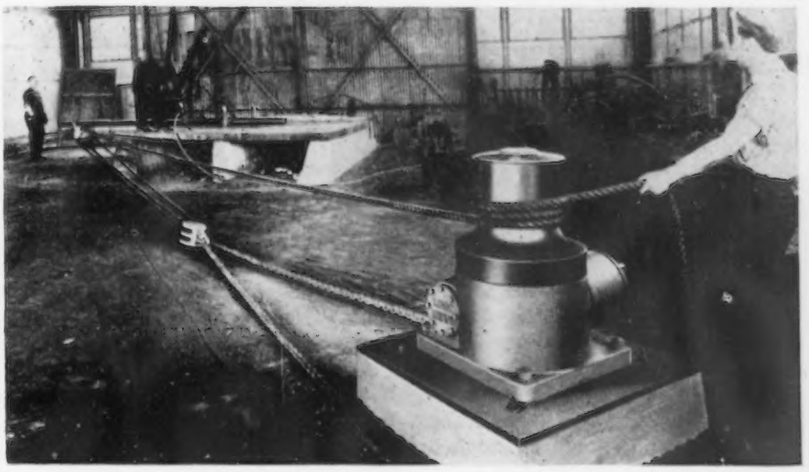
Effect of Interrupted Cooling on Mechanical Properties—The data listed in table XII serve to illustrate the improvement in mechanical properties produced by interrupted cooling as compared with continuous cooling from the tempering temperature.[22] The tests represented in table XII were carried out on 18-4-1 high-speed steel oil quenched from 2350° F, tempered 2½ hr at 1050° F and cooled as indicated. The values show that interrupted cooling results in a slightly softer steel than does the usual treatment (table XII, designation a), and improvements of 10 pct in transverse strength (designation b), 100 pct in transverse ductility (designation c), 10 pct in sheer strength (designation d), 45 pct in torsional ductility (designation e), and 120 pct in torsional toughness (designation f).

The question might be raised as to whether interrupted cooling at a given holding temperature actually produces better properties than continuous cooling from the tempering temperature followed by a second temper at the holding temperature. The results of such treatments are compared in table XIII. After austenitizing at 2400° F, and tempering at 1050° F, relatively little improvement in torsional strength and ductility are effected by a second temper at 400° F. If, on the other hand, the cooling from the 1050° F temper is interrupted at 400° F, the torsional properties are markedly enhanced. Thus, it is clear that the retempering treatment is not equivalent to interrupted cooling—a conclusion which is explainable in the light of the transformational characteristics.

It may be noted that the manner of cooling between the tempering and holding temperatures is quite flexible. Furnace cooling, air cooling or hot quenching to the holding temperature may be used. It is important, however, not to cool through the anticipated holding temperature before returning to it, because part of the retained austenite will thereby transform to martensite, thus leaving less austenite for the isothermal transformation.

Next week the authors explore the theoretical and practical aspects of sub-zero treatment of high-speed steel.

PIPE up to 8 in. dia. is bent at Ohio Pipe Bending & Machine Co., Cleveland, using a combination of pulley block and Link-Belt electric car spotter. Pulley block cuts down the speed, besides forming a convenient connection. Spotter rope pulls pipe against removable pins or plugs which are set into steel bed plate in predetermined positions according to the degree of bend desired. Work was formerly done by two men pulling on a double handled ratchet type hand winch.



Effect of Hot Forming Temperatures on Magnesium

MAGNESIUM plate held at 600°F for 2 hr will show a reduction of transverse ultimate strength and yield strength of 10.5 pct and 21.1 pct respectively, according to an investigation recently conducted by Northrop Aircraft, Inc., Hawthorne, Calif. The study was made in connection with problems encountered in forming spoilers for the P-61 airplane and were undertaken specifically to determine the loss of mechanical properties of ¼-in. hard rolled magnesium plate (type J1-H) after exposure to temperatures from 300°F to 600°F for periods of 1 to 2 hr.

A plate of 0.250-in. thick magnesium was cut into standard test specimens (type V—specification QQ-M-151a) having a reduced section ¾ in. wide and the full thickness of the plate. Half the specimens were cut parallel with the direction of rolling (longitudinal) and half were cut normal to the direction of rolling (transverse). The specimens were heated in a muffle-type furnace equipped with thermostatic control which held the temperature to ±10°F. Five longitudinal and five transverse specimens were simultaneously heated for each condition tested. All specimens were pulled to destruction in a 60,000 lb capacity Southwark universal testing machine. Strain was measured with a Starrett dial gage having a minimum count of 0.0001 in. All tests were conducted at room temperature. A summary of the results is given in table I.

The conclusions drawn from the tests were that temperatures up to 450°F reduce the transverse ultimate strength and yield strength 3 pct and 5.1 pct respectively and the longitudinal values by 2 pct and 5.5 pct respectively. These values remain practically constant for the time periods between 1 and 2 hr. Above 450°F, the length of time at a given temperature is a factor influencing the reduction of mechanical values. At 600°F, material held for 2 hr showed a reduction of transverse ultimate strength and yield strength of 10.5 pct and 21.1 pct respectively and of longitudinal ultimate strength and yield strength of 6.4 and 25.6 pct respectively.

TABLE I

Effect of Temperature on Magnesium

(Average for five samples at each time and temperature interval)

	Transverse			Longitudinal		
	Yield—0.2 pct offset—psi	Ultimate strength—psi	Elongation in.	Yield—0.2 pct offset—psi	Ultimate strength—psi	Elongation 2 in.
Control—(as read)	36,760	48,200	12.1	36,300	46,280	8.3
300°F—1 hr	36,810	47,600	21.0	35,660	46,000	18.4
350°F—1 hr	36,840	47,620	20.3	35,460	45,840	17.8
350°F—2 hr	36,350	47,500	19.4	35,820	46,120	19.7
400°F—1 hr	35,140	46,780	16.0	34,720	45,650	16.4
400°F—2 hr	34,900	46,780	16.4	34,320	45,370	12.9
450°F—1 hr	34,840	46,700	16.9	33,700	45,660	14.9
450°F—2 hr	34,420	46,550	19.9	33,640	45,490	14.3
500°F—1 hr	33,580	46,520	17.9	32,060	45,680	20.9
500°F—2 hr	32,170	46,200	19.8	31,230	45,140	18.2
600°F—1 hr	30,760	44,360	25.1	28,490	43,840	26.1
600°F—2 hr	28,990	43,140	24.3	27,030	43,340	25.3

Eliminating Inclusions from Special Steels

SINCE the larger the nonmetallic inclusion the easier and quicker is its elimination, the procedure applied at the Usines Saint-Jacques for making special and high-quality steels and described by G. Ranque in *Revue de Metallurgie, Memoires,* vol. 39 and 40, 1942, creates conditions that produce the largest possible inclusions when adding ferroalloys. Ferroalloy additions are made when the bath is overheated and saturated with dissolved oxides. This procedure also eliminates the risk of introducing hydrogen with these additions.

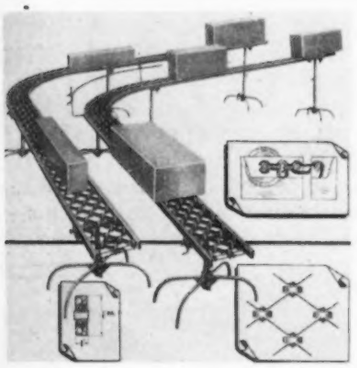
Deoxidation is done in the last phase of the heat, at a falling temperature, by adding deoxidizing elements to the slag.

New Equipment . . .

Materials Handling

. . . Various developments of general utility in all types of materials handling including lifting bars, lift tables, test tables, dollies, crane cab coolers, wire rope clamps, portable cranes, hand trucks, electric trucks, eye bolts and many other devices are described in this week's digest of manufacturers' announcements.

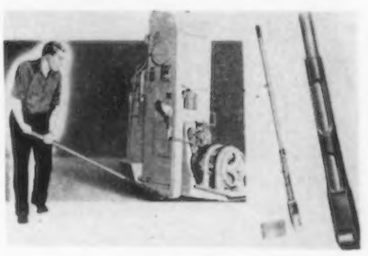
A PORTABLE conveyor called the Load-Veyor has been announced by the *Market Forge Co.*, 80 Garvey St., Everett, Mass. This conveyor is reversible so that either side may be used. One side may be used for the moving of large packages, while the reverse side is used for the conveyance of small packages, in which case the side members act as guide rails. Each 10-



ft length weighs only 58 lb, and one man can easily carry two sections. Removable connectors or couplings are available, thus simplifying the assembly of the conveyor unit. Another interesting feature is the fact that the stands may be attached in any position along the length of the conveyor, so that sufficient support may be furnished to accommodate any practical load.

Lifting Bar

ROL-R-LIFT, a lifting bar with which one man can easily lift as much as a 5-ton load, has been announced by *Arnholt Motor Co.*, Warsaw, Ind. This is said to be the only lifting bar with a hardened steel roller for extra leverage and ledges for safe gripping. It can be furnished with any of three styles of interchangeable toe plates: (1) notched for prying up spikes and



leg bolts and getting under heads and corners; (2) straight-edged for lifting and moving, and (3) straight-edged with rubber-coating to prevent scratching enameled or finished surfaces. Because it is claimed to save time and manpower, this lifting bar is especially recommended for use in relocating machinery in plants, for moving or wrecking buildings, and for use wherever heavy objects must be lifted onto dollies or otherwise moved.

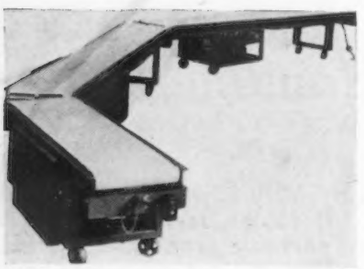
Packing Liner Fabric

AQUASTOP, a synthetic, impregnated, coated and chemically-treated, tough, flexible waterproof packing liner fabric, has been announced by the *Protective Coatings Corp.*, 689 Main St., Belleville, N. J. With the use of this fabric an actual breathing package is said to be obtained. For, while a complete waterproofing is accomplished, moisture vapor as high as 10 g per 100 sq in. per 24 hr is transmissible. This breathing property of Aquastop resists corrosion from condensation within the package due to temperature changes. These protected packages are said to keep contents perfectly dry even after many weeks of submersion at depths where high pressures are encountered and, if the contents and box do not weigh over 60 lb per cu ft of water displacement, these sealed boxes will float for an indefinite time without damage to contents.

Powered Belt Conveyor

TO meet present day needs for flexibility in conveying equipment, *Island Equipment Corp.*, 101 Park Ave., N. Y., has announced a small powered belt conveyor unit, in 10, 5, and 3 ft lengths. These units can be coupled together to make as long a conveyor system as may be wanted. They can, it is claimed, due to their short lengths, be twisted around to form any shape, and will convey on the level, up or down grade. The entire assembly or system can be instantaneously controlled from the unloading end, by positive push button control, and can be quickly added to or shortened, as may be desired.

No guides are required, at any point, to keep the material being conveyed from jumping or running



off the belt. They travel from one end of the system to the other, around curves, without any guides or attention.

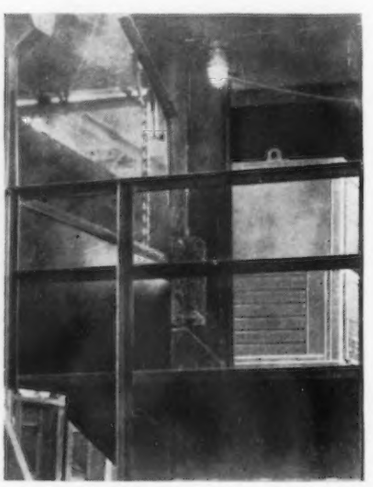
Lift Table

MANY new features have been added to the Lewis-Shepard handy hoister, announced by *Lewis-Shepard Products, Inc.*, 245 Walnut St., Watertown, Mass. It is said to be a light but rugged production tool that fits into any manufacturing process requiring the lifting and transporting of tools and raw materials. Among the features are the heavy gage steel construction of the bracket, backplate and platform; roller bearing sheave on hardened and ground shaft; strong, channel type uprights; tubular bracing and base members; ball bearing guide wheels; open end base; swivel casters, and wheels

are all roller bearing mounted and are available in semi-steel, rubber or celoron. It is available in two types—CH with casters at front and DH with handle at front.

Air-Cooled Conditioning Unit

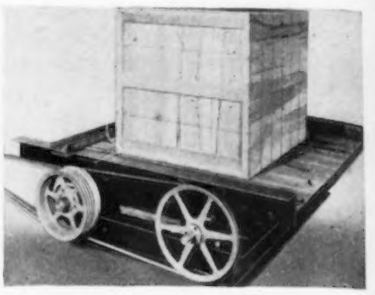
AN air-cooled conditioning unit for crane cabs working over ingot molds, soaking pits, or vats where acid or other fumes are present has been announced by the *Dravo Corp., Machinery Div.*, 300 Penn Ave., Pittsburgh. The unit which is fitted to the top of the cab is entirely self-contained, and requires only an electric power connection for its operation. All equipment is enclosed in a steel frame and housing. The air supplied to the cab is cooled, cleaned, and constantly circulated. Dust and smoke are dissipated, and even acid fumes are eliminated by a special fume absorber. The unit itself is said to be designed with a rugged



construction calculated to withstand the vibration inherent to heavy duty crane operation.

Test Table

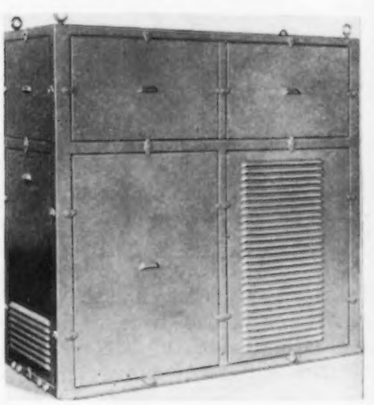
A TEST table that vibrates and shakes like a freight car, even to the pitch and toss, to test packages and products to be sure they will arrive in good condition and will work without home tinkering, has been announced by *The L.A.B. Corp.*, Summit, N. J. Two eccentric shafts, one under each end of a strong table cause the table to vibrate with a circular motion in a vertical plane, and with a displacement about the same as the maximum deflection of average freight car springs and at a frequency similar to their natural frequency. Advantages claimed for this table are: (1) expedite new product design; (2) accelerate life and fatigue tests; (3) aid production quality control; (4) assure correct operation on delivery; (5) reduce freight damage losses; (6)



economize packing, and (7) allow visual study.

Crane Cab Cooler

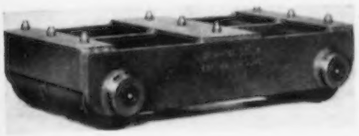
A COMPLETE air-cooled unit known as the "Aire-Rectifier has been announced by the *Lintern Corp.*, Berea, Ohio. It is claimed it will operate successfully in ambient temperatures up to 170° such as encountered on open pit, stripper, and ladle cranes. Two models cover the entire range of requirements for air conditioning crane cabs. They are said to have complete filtering equipment for removing dust, smoke, vapors and noxious gases. They will hold the cab (properly insulated) at 80° to 85° in ambient temperatures up to 170° with a relative humidity of from 30 to 50 pct. They also offer automatic electric heat to keep the cab at 72° to 75° for winter operation



Dollies

SKID-ROL dollies have been announced by *Tachtmann Industries, Inc.*, 828 N. Broadway, Milwaukee. They are obtainable in pairs and are used for shifting machines, tanks, boxes, steel blocks, dies, furnaces and heavy objects in loads from 10 to 12 tons. If in-

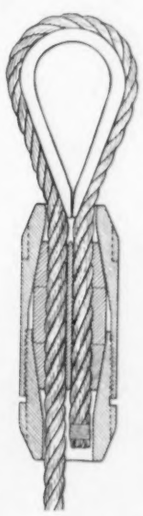
verted these dollies can be used for a standing dolly for moving steel beams and girders. It is claimed



that these dollies reduce personal injury cases to a minimum and accidents due to passing and positioning rollers are avoided. Each dolly is 18½ x 10½ x 4-in. high, and is equipped with four all-steel rollers 3¾ in. in diam. Roller bearings are lubricated through Zerk fittings.

Wire Rope Clamp

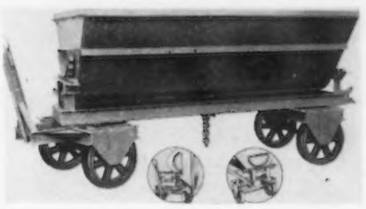
A WIRE clamp called Cabl-Ox has been announced by the *Nunn Mfg. Co.*, 2125 Dewey Ave., Evanston, Ill. This clamp is said to incorporate a wedging action in its component parts. This is the feature which makes it possible to hold loads in excess of the tensile strength of the rope used. The unit is alloy steel, cadmium plated for weather protection, streamlined for neat appearance and freedom from obstruction. This clamp is easily assembled by unskilled labor and



can be readily disassembled for the tightening of stretched lines or other uses.

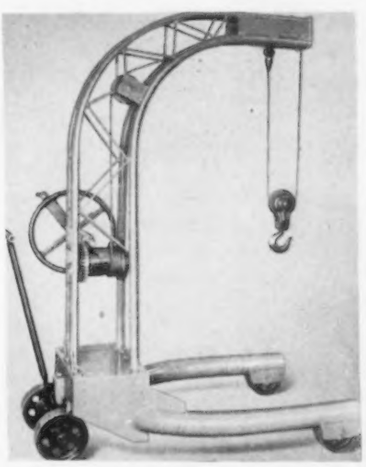
Side Dump Trailer

A SIDE dump trailer in which dumping is controlled to either right or left side, as desired, has been announced by *Palmer-Shile Co.*, 784 S. Harrington Ave., Detroit 17. Gear type dumping rockers are said to provide smooth action dumping, and an automatic coupler at rear permits the use of trailer in train hauling. This trailer is said to be so designed as to insure perfect trailing in train and when turning corners. The trailer is of all-welded construction, having heavy gage reinforced steel body, mounted on a structural steel framework.



Portable Crane

FOR handling loads where overhead lifting equipment is not available, a Canton portable crane has been announced by *The Hill Acme Co.*, Cleveland 2. This crane, made of welded steel, weighs less than half as much as previous models. Two-speed operation is provided by means of a single or double cable for light or heavy



loads. Adjustable extension handle gives additional leverage for extra heavy loads. A self-locking worm mechanism holds the load with safety at any point. The crane is now available in all models of one to three ton capacity. Greater strength, lighter weight and safer operation are the outstanding features claimed.

Tire Shields

SHINGUARDS for mine shuttle car tires which take a heavy beating far underground have been announced by *The Goodyear Tire & Rubber Co.*, Akron, Ohio. These tire shields are circular protectors of ⅜-in. steel which may be applied easily and quickly, extending far

enough up on the tire to protect the sidewall area where cutting and snagging might otherwise occur. Use of these shields, is said to have solved the answer to many tire failure problems, in coal mines, where shuttle cars must move over sharp edges of fallen slate and rock and against projecting pillars of coal. No change in tire pressure is required. The shields clear the tire safely, giving plenty of room for normal flexing without chafing of the sidewall.

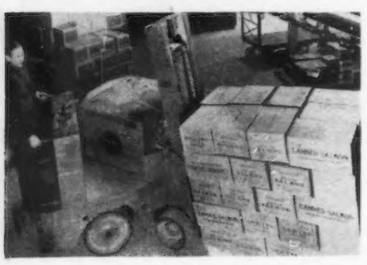
Hand Truck

AN all-welded steel truck adaptable for operation in narrow aisles and for picking loads in close quarters, has been announced by *The Schmidgall Mfg. Co.*, 307 Cass

St., Peoria 2, Ill. The large carrying platform and slightly curved bands make this handy truck practicable for any type of trucking in industrial plants, mercantile establishments, bottling works or any place where materials within its limits require moving. It is said to be designed for handling barrels, kegs, sacked material as well as boxes or crates. A single handle makes possible handling of bulky and heavy loads with one hand.

Fork Truck

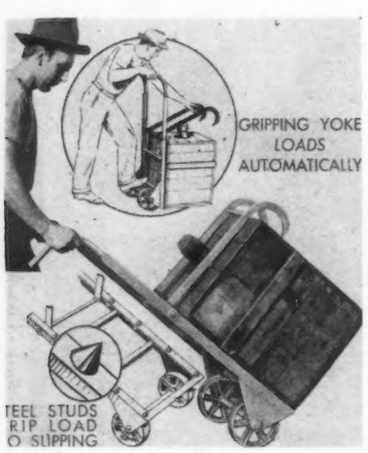
A 4000-lb capacity truck known as the type AIMH articulated fork truck which is designed primarily for efficient warehouse operation, has been announced by *The Baker Industrial Truck Div., of Baker-Raulang Co.*, 2168 W. 25th St., Cleveland 13. This truck involves a revolutionary principle permitting a warehouse operator to in-



crease the available storage area by cutting aisle requirements. Specific advantages claimed for this truck are: (1) works in narrower aisles; (2) turns in a smaller radius; (3) spots loads quicker and easier; (4) control units are more accessible; (5) simpler steering design cuts maintenance, and (6) permits mechanization of handling where hand trucks were necessary because of space limitations.

Carboy Truck

A TRUCK suited for easy loading and convenient handling of carboys has been announced by *Palmer-Shile Co.*, 784 S. Harrington Ave., Detroit 17. The truck is rolled up against carboy and the



gripping yoke is dropped over the top. The track handles are pulled back and loading becomes automatic. Hardened steel studs on the truck frame hold load in place, and to unload simply tip truck forward and release gripping yoke. It is of all-steel construction, overall width only 20 in., which permits passage through narrow doorways and crowded aisles.

Electric Truck

ADDED to their line of materials handling machinery is the Worksaver electric truck, announced by *The Yale & Towne Mfg. Co.*, 71 Vanderbilt Ave., N. Y. 17. With power for lifting and power for travel, this truck is said to relieve its operator of all physical strain. Compact and easily controlled, it can be maneuvered in congested areas, along narrow passages and around sharp corners without waste of time or effort. It is available in two types: (1) platform, and (2) pallet. The former is designed to handle single unit loads,

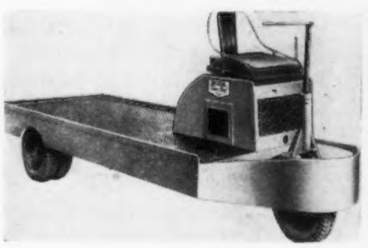
consisting of a crate, bale, or multi-unit loads on skids or in skid bins up to 6000 lb. The latter to handle single or multi-unit loads which are palletized up to 4000 lb. Many safety features are claimed for this truck.

Coil Steel Truck

A COIL steel truck especially engineered for easy loading and convenient handling of coil steel when moving from one department to another within the plant, has been announced by *Palmer-Shile Co.*, 784 S. Harrington Ave., Detroit 17. As a coil is rolled against rear or loading end of truck, the truck end settles down to take on the load, and then automatically straightens out again as the load rolls onto the truck. A 1-in. dip in the floor of the truck holds the load in place. This truck is said to have heavy channel side members, all-welded construction and to be equipped with one 6 x 2-in. steering caster and two 8 x 2-in. wheels, all of which are roller bearing.

Shop Truck

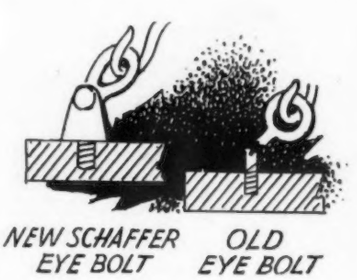
THE Buda chore boy, model FF, is a dual wheel, heavy duty, platform type shop truck of one ton capacity announced by *The Buda Co.*, Harvey, Ill., and is said to be ideal for handling heavy materials. It has an extra large non-skid deck with a loading space of over 20 sq ft, and is provided with dual wheels in order to carry extra heavy loads.



This platform truck is said to be versatile, has many uses in industry, and is especially desirable when equipped with fire fighting equipment. Its extra large platform makes it ideal for carrying heavy loads at grain and feed mills, warehouses and railroad jobs. It is equipped with an air-cooled 7.7 hp engine capable of speeds up to 15 mph and with an economy of operation of 35 to 40 miles per gal of gas.

Eye Bolt

THE Schaffer load-centering eye bolt, announced by *S. S. Schaffer & Co., Mechanical Handling Div.*, 4211 S. Alameda, Los Angeles 11, is said to carry 100 times the load of the ordinary standard eye bolt, because it lifts in line with



load. It is said to eliminate the use of unnecessary chains and is very simple and easy to install and use. It also increases production and cuts labor costs. This bolt is made of high grade steel, and is light in weight and precisely balanced, with replacable bolts for extra long life.

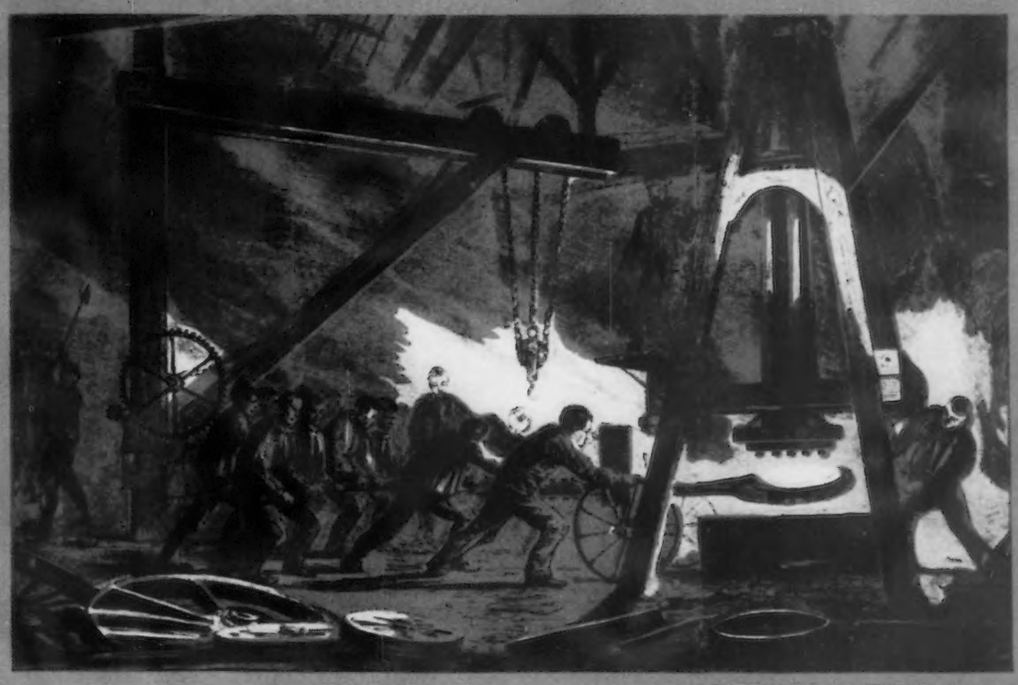


PHOTO COURTESY OF THE BETTMAN ARCHIVE

FROM A METAL-MASTER'S "FAMILY ALBUM"

WHEN LOCOMOTIVE WHEELS WERE MADE LIKE THIS...

STANDARD STEEL'S present home had been a source of metals for . . . 70 years

You'll notice—in this scene in the shop of some important locomotive wheel supplier of the early 1860's—that although the product was metal most of the equipment was wood and that muscle played as large a part as machinery in the operations. When all this represented standard production practice, Standard Steel's ancestor "Freedom Forge," already over 70 years old, was one of the largest in the state with eight fires and five hammers, and had a tire mill with capacity of 2000 per year.

Pioneers in the early days of the country, Standard Steel has been pioneering ever since. One important development is in rolled wheels, where Standard was the first to retain the axis of the ingot as the axis of the wheel. Recent developments include improvements in heat treatment and control of rate of cooling, which have greatly increased the safety and serviceability of the product.

When you need forgings or castings, 151 years of accumulated experience is waiting to serve you here . . . backed by complete modern facilities. To simplify purchasing problems, "Standardize on Standard."

BLW THE BALDWIN GROUP **BALDWIN**

FORGINGS AND CASTINGS

The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham.

"STANDARDIZE ON STANDARD" FOR YOUR FORGINGS AND CASTINGS

Assembly Line . . .

STANLEY H. BRAMS

• Outlook brightens for production during term ahead, with GM plants likely to get to notable volume levels by June . . . Convention of auto union will start next weekend and absorb labor's full attention.

DETROIT—Settlement of the General Motors strike is a preamble to a start of mass production by that manufacturer for the first time since 1941. The five automobile producing divisions of General Motors had barely begun to move when the plants were shut down on Nov. 21.

At that time Chevrolet was building only around 250 units a day in passenger cars and 1500 trucks, Buick was producing no more than 200, Pontiac about the same, Oldsmobile about half that and Cadillac around 40. Schedules called for a gradual increase, with February and March set for peak levels in the 1946 model year.

As a result of 115 working days lost in the strike, plus however many more to accrue from Mar. 18 before individual plants can be reopened, the General Motors manufacturing schedule is moved forward just about three months. It will be possible to make up some of the time lost in the strike because inventories are in somewhat better position than they were at the time of the shutdown, but stockpiles are by no means uniform and surcease from worries on this score is not yet at hand. However, June will probably see the various GM divisions manufacturing at definitely good rates, probably in the neighborhood of 150,000 assemblies or more for that month.

The end of the General Motors strike also permits plans for reopening of Packard Motor Car Co., whose assembly lines have been closed since January due to shortage of two bearings customarily obtained from the Moraine Products division of General Motors at Dayton. Indications are that Packard will be able to start up again about two weeks after Moraine gets into manufacturing once more. No other companies were forced to shut down because of the General Motors strike, although all of them were pinched somewhat on the supply of fuel pumps, manufactured by AC Spark Plug division at Flint, and it may be that production could have amplified modestly above the recent levels had it not been for this strike-narrowed bottleneck.

As has been stated earlier (THE IRON AGE, Feb. 14, 1946, p. 82) the labor skies have been steadily clearing, and now the ending of the General Motors strike establishes without doubt that the crisis is well behind us. The only strikes which are continuing are in plants where disputes are going on as to exceptions from the 18-18½¢ wage raise level set up by national policy. In none of these plants are there factors for imposing wholesale stoppages on the auto industry, and accordingly the production path from here forward should be upward—slowly, to be sure, because of inventory situations, but none the less steadily.

Detroit

• • • Confirmation of the expectation expressed in the accompanying article, that there would be no 1947 model introductions this year, was contained early this week when Ford Motor Co. said it would run on 1946's all through the year. Ford said the move was necessitated by post-reconversion delays which had cut down its volume to date.

Ford's current output today has risen to around 2000 units per day and will be at 3000 by the end of the month, the best level attained yet by this manufacturer in the postwar period. This is quite an improved picture as compared with a few weeks ago, when all assembly lines were down due to a variety of parts shortages.

Chrysler Corp. is currently manufacturing 2300 vehicles a day, and its schedules are mounting. Thus far the corporation has shipped 108,000 cars and trucks to its 9651 dealers, of which 55,000 were trucks. Studebaker, Nash, Hudson and Willys-Overland are also assembling at ascending rates and have hopes of being able to so continue. For last week the auto industry as a whole was estimated by Ward's Automotive Reports to have built 35,020 vehicles, the highest level since auto manufac-

IT'S ALL OVER NOW: *Here and there one can find some serious expressions, but on the whole GM workers are glad that the longest strike in industrial history in this country is over. Full speed on automobile production is a foregone conclusion.*

"SHOW-HOW" based on "KNOW-HOW"

Each year the nation-wide staff of "Greenfield Men" save threading tool users dollars, machine downtime and broken production schedules . . . simply by "show-how". (That's "know-how" in action!)

These expertly trained men follow up sales, give advice on new jobs, and straighten out troublesome threading problems. No charge, of course.

That's another big PLUS value when you buy "Greenfield" taps, dies, and gages. You get on-the-spot service from your "Greenfield" distributor *and* the experienced "Greenfield Man" in your locality. *Such service often saves customers more money than their annual tap bill.*

GREENFIELD

GREENFIELD TAP and DIE CORPORATION

GREENFIELD, MASSACHUSETTS

turing was resumed. The week before the figure was 23,050, and a year ago at this time the total of trucks was 20,505.

THE late starts into mass output which are being made by all manufacturers quite uniformly are giving rise to the general expectation in Detroit that there will be no 1947 models as such until far after the customary summer changeover period. Demand in the field for new cars is incessant, and as long as some manufacturers go on supplying that demand none of the others can afford to close down and risk the wrath of their dealers by shutting off the supply for two months or so.

Consequently, it becomes logical to expect that passenger car output will continue in a mounting crescendo all through this year, with the first 1947's not appearing until January or thereabouts, and perhaps not at all. Of course there will be new cars shown during the fall, but they will be in the nature of additions to lines rather than complete makeovers. The extension of the model year, induced primarily by demand, is rooted almost as much in the need for amortizing tooling cost over a run of customary length. If shutdowns were to be made in June and July, as usual, it is quite evident that there would be represented in the total of manufactered asssemblies no more than two or three, or at the outside, four months of customary good production—a far cry from the requirements of the cost accounting side of the business.

COME what may, there is little likelihood of labor trouble for the next fortnight. On Mar. 23, the CIO United Auto Workers Union begins its annual convention in Atlantic City, and for a week all eyes and attention will be focused on that momentous series of meetings, rather than on problems or fancied problems in the shops at home.

A wild and wooly convention is anticipated. Walter Reuther, head of the union's General Motors Dept., is expected to make a run for the presidency of the union against incumbent R. J. Thomas, and insiders give him a good chance for success. Thomas has been president of the union ever since the Homer Martin split, and during that time has never had serious opposition. The way locals are jumping on the draft-Reuther bandwagon indicates that the burly good-natured president of the auto union may have a severe tussle on his hands from his ambitious redheaded lieutenant.

FIVE GOOD REASONS: *Regardless of the controversy of whether the company or the union gained in the recent GM settlement, the "near and dear ones" are glad it's over. One look at this picture proves the point.*

General Motors Strike Settlement Seen As Victory for Company

Detroit

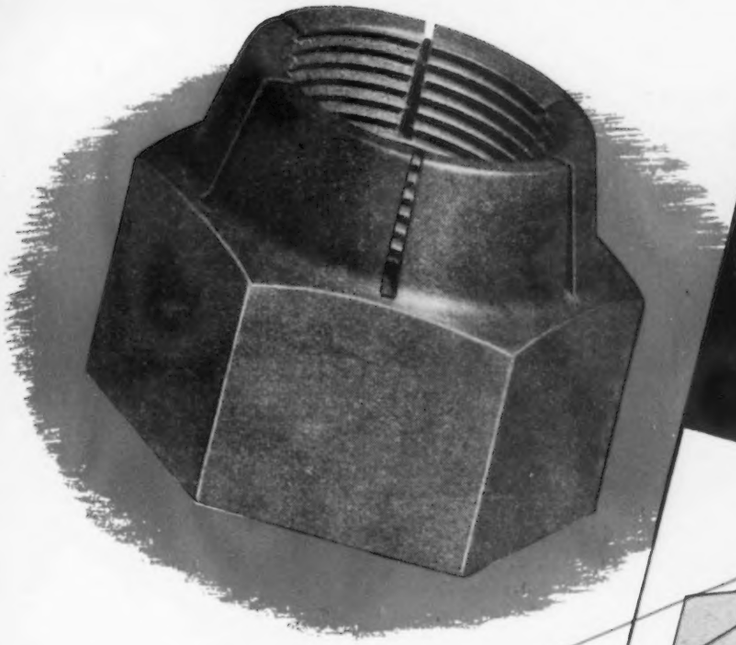
• • • **Settlement of the** General Motors strike must be considered a victory for the company, inasmuch as the agreement was basically at the same level which General Motors has been proposing for the past fortnight. The hopes of Walter Reuther, head of the General Motors department of the union, that he could achieve a settlement at a 19½¢ raise level were smothered in the final agreement calling for 18½¢ plus adjustment of whatever inequities were found to exist in the plans. Union people maintained that the inequity adjustments would more than make up the cent of difference between the two parties.

Another hotly disputed clause in the final settlement revolved around transfers and promotions. The language of the agreement reads that where ability, merit and capacity are equal, employees with the longest seniority will be given preference. Management promised that it would try to assist employees who desire transfers to new positions and make applications for them.

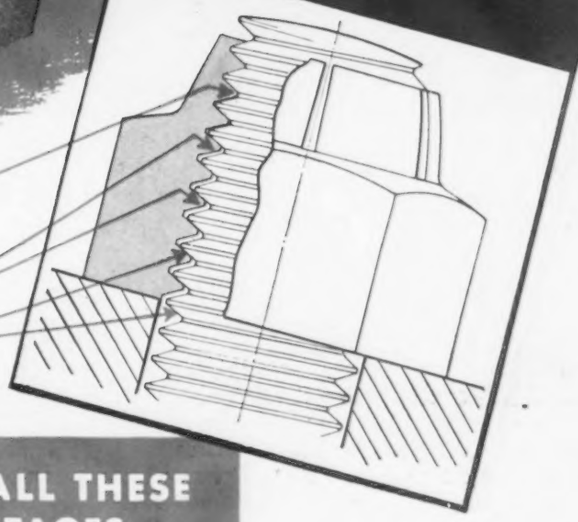
General Motors granted the union a checkoff in place of the former maintenance of membership proviso. Members are listed by the union and then have five days, following notification by the company of such listing, to disclaim membership in the union. If no disclaimer is filed in that time, dues are checked off for the life of the contract, unless advantage is taken by the employee of a further "escape period" from May 31 to June 9 of this year.

General Motors granted a retroactive pay raise of 13.5¢ starting Nov. 7 last. This amounts to about two weeks' work for the rank-and-file employees, but continues up to date of contract ratification for all workers, which means that maintenance men will get a windfall on the added amount covering approximately four months.

The contract is in force for a period of 2 yr, but it is provided that it may be reopened for wage negotiations at the end of 1 yr.



HUGLOCK NUTS by "National"



The UPPER threads of the Huglock nut press inward against the bolt.

The remaining threads of the Huglock nut have slight clearance at their lower flanks and frictional contact on the load-carrying flanks.

The lock nut WITH ALL THESE ADVANTAGES . . .

1 *One-piece construction*—reduces assembly time and avoids possible failure to install supplemental locking medium.

2 *Self-locking action*—the Huglock Nut grips the bolt threads and maintains locking effect, whether seated or not, on the load-carrying flanks of the threads.

3 *Axial thread play eliminated*—Huglock Nuts are vibration-proof and shock-proof.

4 *Thread load is distributed* over all the threads of the nut, instead of being concentrated on the few bottom threads.

5 *Maximum thread shear strength*—full strength of the most modern 180,000 lb. tensile alloy bolt will not strip threads in nut. (Compare this with other designs.)

6 *All metal construction* permits applications involving high temperatures, oil or other types of moisture. Self-locking is maintained at high temperatures.

7 *Easily installed*—Huglocks start freely and may be tightened rapidly by standard hand or speed wrenches.

8 *Economical to use*—cotter pins, lock washers, key plates, jam nuts or other secondary locking devices are completely eliminated.

9 *Re-usable*—repeated removal and re-use on the same bolt or a similar bolt will not destroy the locking action.

10 *Controlled preset torque values* are built into Huglocks, insuring the vibration-proof results visioned in your engineering designs.

U. S. Patents 2290270, 2333290, 2337797. Other Patents Pending

National HEADED AND THREADED PRODUCTS

Other "National" Specialties Include the Following:

Phillips Recessed Screws	Drake Lock Nuts	Scrivets
Laminar Flow Screws	Place Bolts	Hi-Shear Rivets
Marsden Lock Nuts	Lok-Thred Studs	Sems
Dynamic Lock Nuts	Rosan Locking System	Clutch Head Screws

Send for samples and consult with us on *any* fastener question.

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

Washington . . .

L. W. MOFFETT

• Reece Bill to clip FTC's wings probably will be defeated despite strong business support . . . Reducing any government agency in size or power most difficult.

WASHINGTON—Despite the strong forces supporting the measure, it is probable that defeat faces the Reece House Bill which would strip the Federal Trade Commission of much of its power. Indications are that the FTC, always powerful in pushing or opposing legislation affecting it, in a characteristically long tirade of testimony at hearings on the measure, apparently has succeeding in blocking its enactment.

Representative Carroll Reece, Republican of Tennessee, author of the bill, nevertheless has said that he will press for early action of the legislation. It was the object of prolonged hearings before a subcommittee of the House Committee in Interstate and Foreign Commerce.

Pointing out that the FTC's powers as "prosecutor, judge and jury" have been copied by administrative agencies set up in recent years, Representative Reece said that the major objective of the bill is to make the right of appeal to the courts against FTC rulings "a real democratic right based on justice instead of the futile, rubber-stamp affair it is now." The bill, he pointed out, would achieve this by requiring the FTC to base its findings on the weight of "preponderance" of the evidence.

"As the law now stands," Representative Reece declared, "the courts must uphold the FTC's decisions if there is any evidence to support them and the courts have admitted that they cannot weigh the evidence nor modify the decisions even though they may find them unjust."

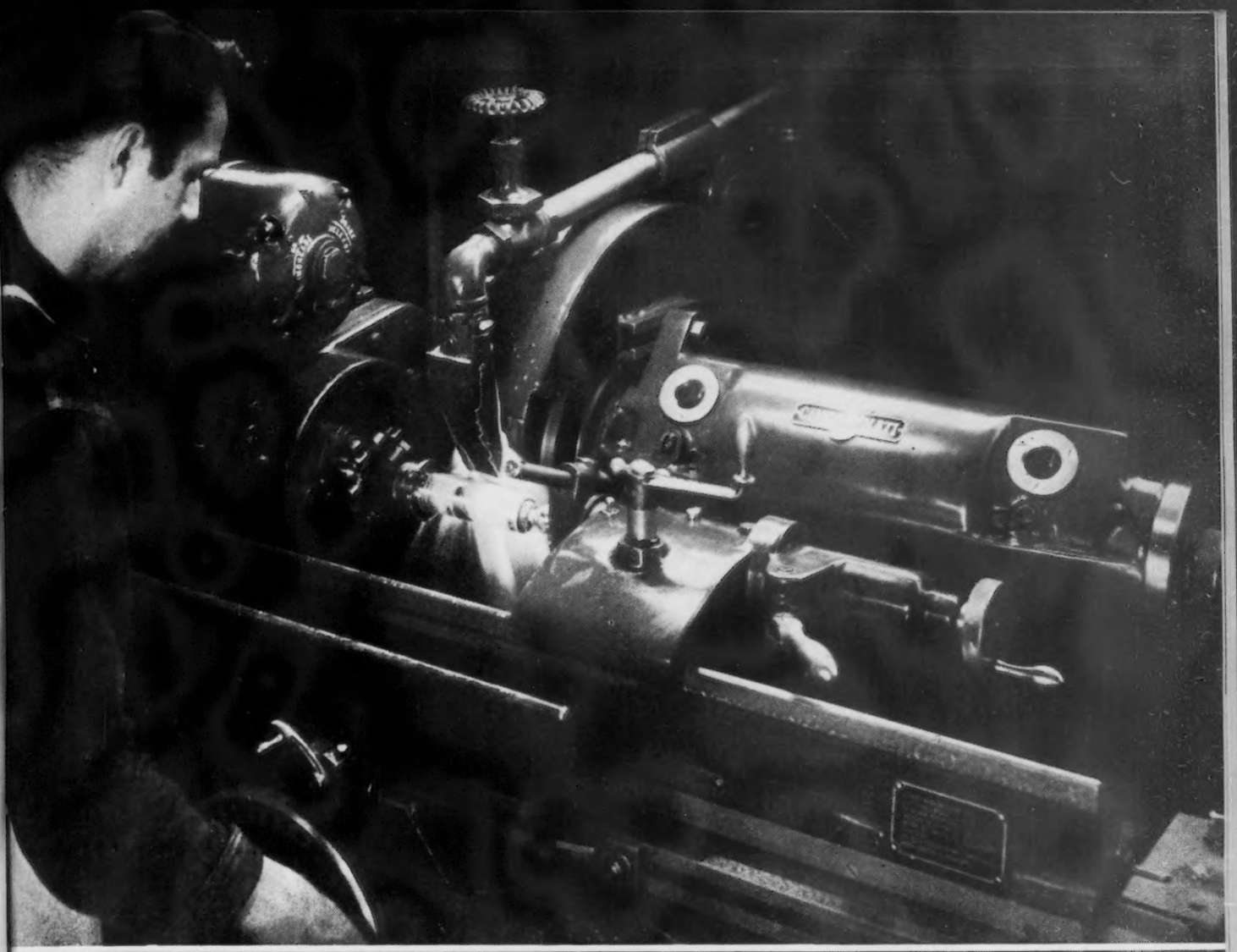
The bill reflects much business sentiment that the FTC is "prosecutor, judge and jury," but the Commission obviously denies the contention. In its testimony it said that it always decides cases on the preponderance of evidence. Naturally, too, the Commission, assuming the role of a pious mentor over the morals of business, resents Mr. Reece's charge that the principles embodied in his bill are a "first line of defense against the tyranny of bureaucracy." Judging, however, from the great growth of the FTC both in power and personnel, and the use it often makes of its authority, business interests insist that Mr. Reece's charges are well taken.

Created in September 1914, the Commission was originally set up to prevent price fixing agreements, combinations in restraint of trade and other unfair methods of competition. But from a small beginning in squat quarters it has run the course of many government agencies and has expanded vastly in both in personnel (about 500) and power, operating in the Apex Bldg., almost within the shadow of the Capitol. Its functions now are much broader. Nothing is too large or too small to excite the Commission into action. On the lesser side, it will issue complaints by the wholesale in the most trivial cases. The Commission now has jurisdiction even over food, drugs and cosmetics, despite the fact that it overlaps the Dept. of Agriculture Food and Drug Administration activities, to say nothing of jurisdiction over false advertising, deceptive acts and practices, price discrimination, wool labeling, etc.

A great part of the Commission's work is in the field of foods and drugs, a job that Mr. Reece wants left entirely with the Dept. of Agriculture Food and Drug Administration. This proposed clipping of its wings has deeply aroused the FTC, whose ambition in line with a general governmental agency pattern is to expand. To contract, in federalese thinking, would be heresy. More power, more personnel and more appropriations is the accepted code, which is still being followed. This is evidenced by the fact that despite the ending of the war government civilian employment of personnel in the executive branch, exclusive of the War Dept. personnel stationed outside of the continental United States, actually increased by 2423 in January over last December.

GOOD RECORD: *No wonder Jim Dewey, Federal Conciliator (special), feels happy. The GM dispute was one of the toughest nuts to crack in his career. Mr. Dewey ranks as the country's ace trouble-shooter.*

This failure to demobilize the hugely swollen civilian personnel is attributed to an enormous amount of unnecessary and harmful activities of government bureaus that have an incurable itch to remain overstuffed and to everlastingly expand. This is one reason why a large group in Congress is opposed to increasing salaries of federal employees. They insist on the payroll being sharply reduced. Then they want to give substantial increases in salaries to those who do a good job in the government but are greatly underpaid, a thing that is



REMOVES .014" IN *One Pass*

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Provides Outstanding Cooling, High Accuracy, Fine Finish

In every shop, a careful study of every factor influencing cutting or grinding efficiency will pay important dividends.

Here, for example, is a typical case in which the use of Sunoco Emulsifying Cutting Oil on a grinding-operation pays-off in fast production, high finish, great accuracy.

Operation: A short-traverse job, grinding cast-iron sleeve.

Machine: Cincinnati 10 x 36 Plain Hydraulic Grinding-Machine.

Material: Cast Iron.

Stock Removal: .014 inch.

Lubricant: 1 part Sunoco to 40 parts Water.

Sunoco makes possible faster metal-removal without increasing wheel-wear. Sunoco rapidly dissipates heat and helps prevent the loading or burning of wheels. Even at high surface-speeds, close tolerances and mirror-finishes are easily maintained.

For tough problems, involving petroleum products, for smooth cutting and grinding schedules, call the Sun Cutting Oil Engineer near you, today

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INDUSTRIAL PRODUCTS

particularly true of government scientists and research workers.

Mr. Reece thinks that FTC suffers from a bad case of squandermania. According to Representative Reece, the FTC was charged with "shopping" for medical experts of doubtful authority as witnesses and conducting costly cross-country tours at taxpayers' expense to get the testimony of such "experts" in order to prove some of the Commission's various cases.

The Reece bill, even though it is not likely to be enacted, may have the effect of calling further attention to waste in government.

A move in this direction on a much wider scale fortunately is making headway. This refers to the Administrative Procedure Act, analyzed in THE IRON AGE of Jan. 3, 1946, p. 178. The measure was passed in the Senate on Mar. 13 and in all probability will get favorable House action soon.

As pointed out by its sponsors the purpose of the measure is to improve administration of justice by prescribing fair administrative procedure. If administered as it should be, the measure will accomplish its purpose.

Steel Wage-Price Rise Hits Other Industries As OPA Adjusts Prices

Washington

• • • **How the steel** wage-price boost has penetrated through other industries in a general inflationary trend is reflected in OPA price increase announcements that followed those made in steel.

Steel castings, automobiles and machinery are only a partial list of products given price increases as a direct result of the wage-price boost in steel.

The first pricing action since the steel wage-price increase was taken when OPA announced on March 12, effective immediately, an industrywide increase of 4 pct in the ceiling prices for all steel castings and railroad specialties.

OPA said that this action was taken to compensate an industry for the unabsorbable portion of an increase in wages under the government wage-price policy. The higher price, OPA said, is designed to restore earnings for the industry as a whole for the next 12 months to the average levels of the years 1936-39.

On Nov. 30 last, to remove impediments to full production of peacetime castings, the steel castings and railroad specialties industry was given an increase of 11 pct in ceiling prices. With the latest action, prices are increased a total of 15.5 pct, compared with levels prevailing before VJ-Day, according to OPA.

OPA said that its action was necessary "in order to carry out the provisions of Executive Order 9697 which requires the Price Administrator to adjust price ceilings in any case in which he finds that an industry is in a position of hardship as a consequence of an approved increase in wages and salaries.

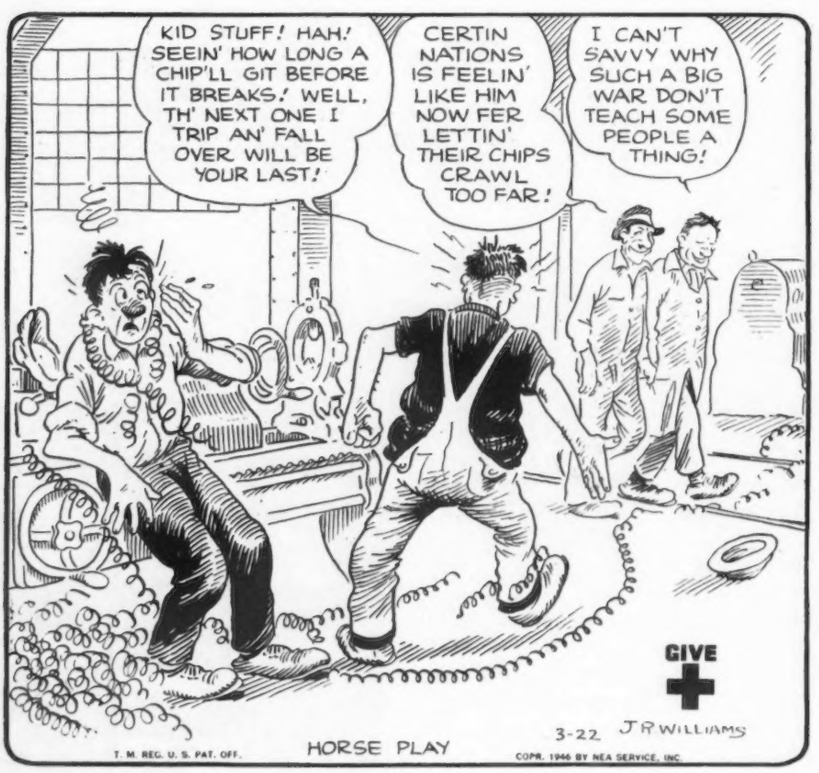
"The bulk of the steel castings industry has made wage increases up to 18½¢ an hr which have received approval of the National Wage Stabilization Board. It is assumed that the rest of the industry will follow the same pattern. After taking the entire amount of the wage increase into consideration, the price agency has found that the industry's current ceiling prices, including the 11 pct increase authorized last November, will leave it in an earnings position requiring adjustment."

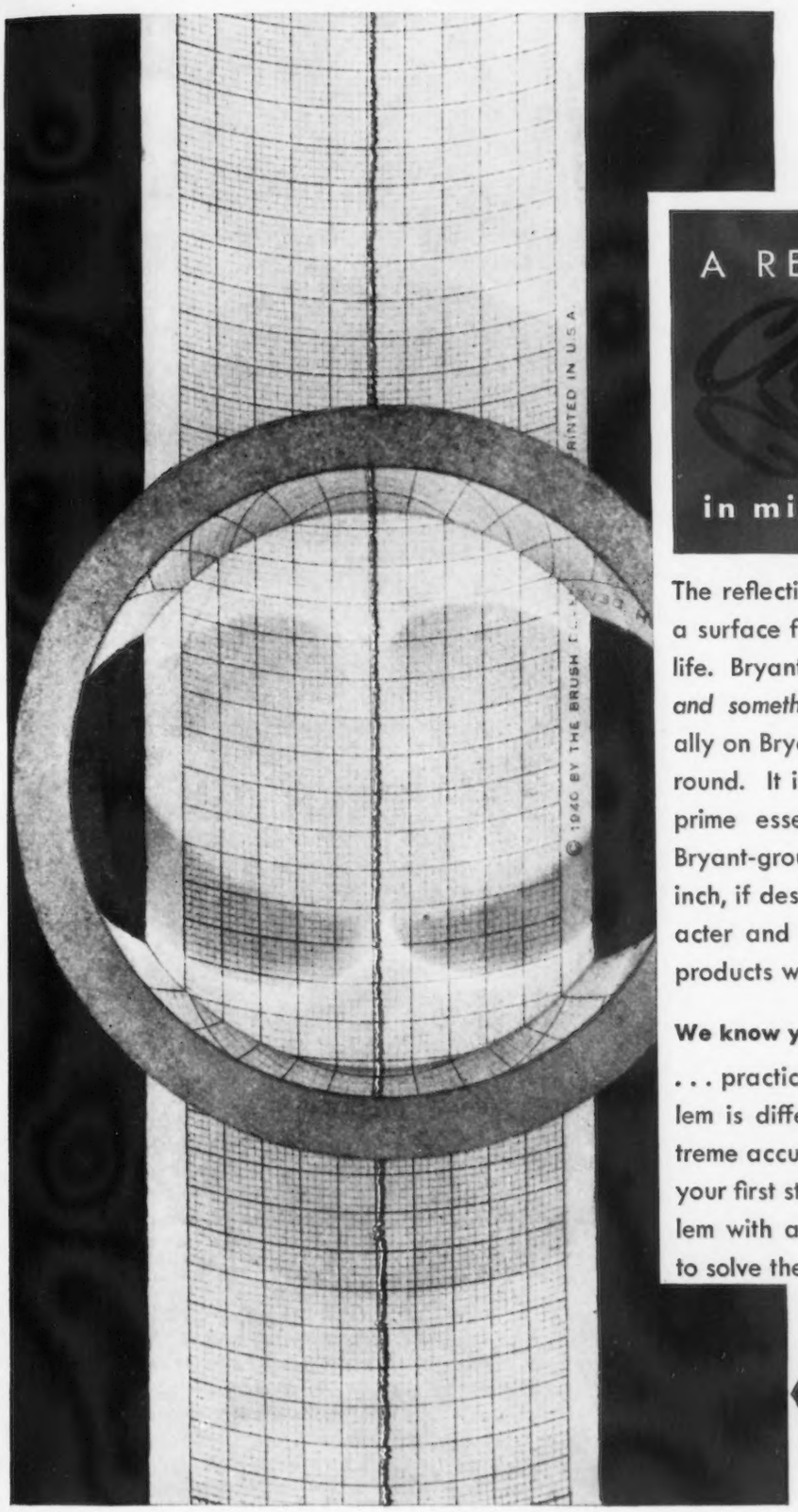
The 4 pct increase in ceiling prices, it was stated, has been determined by projecting the industry's future earnings position on the basis of the most recent profit and loss statement. After giving effect to the wage increase and other expected cost changes, it was the judgment of the price agency that a 4 pct increase would restore the industry to its base period rate of return on net worth for the twelve months following its authorization, at the level of production which may reasonably be expected. Furthermore, the 4 pct increase in ceiling prices is sufficient to prevent loss operation at the present time, OPA said.

The increase is applicable to all existing maximum prices for steel castings. It is also applicable to railroad specialties (car side frames, bolsters, yokes and couplers).

"The increase, however, will not be applicable to the prices of a company which has been granted an individual price adjustment if the individual adjustment was more than 15.5 pct," it was explained.

THE BULL OF THE WOODS — BY J. R. WILLIAMS





A REFLECTION OF *Character*

in millionths of an inch

The reflection in the bushing, at left, shows a surface finish which assures long bearing life. Bryant Grinders assure fine work finish *and something more*—work ground internally on Bryant Grinders is also straight and round. It is the combination of these three prime essentials that gives character to Bryant-ground parts—in millionths of an inch, if desired. These essentials give character and long life to the assemblies and products which you manufacture.

We know your problem is different

. . . practically every internal grinding problem is different, but when you require extreme accuracy or high production, *or both,* your first step should be to study your problem with a man who makes it his business to solve them. Your first step should be to—

Send for the Man from Bryant!

This bushing, with hole ground in a Bryant Grinder, was checked for surface accuracy. The chart line shows deviation. Distance between vertical lines represents one-millionth of an inch.

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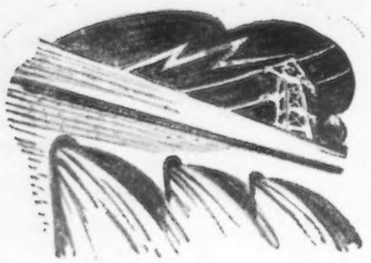
SPRINGFIELD, VERMONT, U. S. A.

West Coast . . .

ROBERT T. REINHARDT

• Prosperity of Portland industries, well on way to full reconversion, is threatened by OPA controls, say businessmen . . . Alcoa's plans watched . . . Bonneville Administration optimistic.



PORTLAND—The noise of clanging bells on shipyard cranes and the roar of furnaces which rose to deafening proportions while this area was contributing more than its share of materials of war, has not affected the hearing of industrialists interested in long-pull prosperity. The switch from a primarily agricultural community to war industry was easily made and the transition back to near prewar status is equally smooth. Business leaders generally attribute this condition to the diversification of its more than 200 small industries, which function against a prosperous agricultural background, and the managements of which are willing to listen to any reasonable proposal for expansion.

While almost all manufacturers of the area are operating at capacity, there are many having their difficulties with material shortages and price ceilings. Approximately 50 businessmen met last week at a press conference dinner under the auspices of the National Assn. of Manufacturers to air their views on Office of Price Administration restrictions. Many of the difficulties of the present situation were laid at the door of this agency which was termed by one man "the office of profit administration." There was a lack of unanimity on the solution to the problem with the thinking about evenly divided between complete abolition of the agency and a more intelligent administration of its primary functions.

Eugene Caldwell, vice-president and general manager of the Hyster Co., was outspoken in favor of the abolition of the OPA. He said, "We are operating in the red. Our labor rates are up 43 pct and we have been granted only a 5 pct increase on 20 pct of our products. Unless we get some relief we will not be able to operate very long. It would be better to eliminate the OPA entirely as it is badly administered and we see no hope of relief at the present time."

Reflecting the thinking of many of the business men, Wade Newbegin, president of R. M. Wade & Co., said, "We are short of the farm machinery which we distribute and are getting even less now than in 1945. This condition is certainly not good in the light of the food shortage and is in large measure attributable to the OPA restrictions on manufacturers which tend to hold down the volume production which we need today. However, I do not favor the elimination of price restrictions entirely because the possibilities of inflation are too great and too serious. I believe we should work for a more intelligent administration of OPA and plan now to permanently eliminate it in 1947 when competition will then take over its functions."

Arthur M. Mears, president of Oregon Steel Mills, told members of the press on the NAM tour that 60 pct of the production of his company was now going into the more profitable export market, although the domestic market was not being deprived of any scarce items through such operation. He added, "However, price relief must be afforded us and similar producers if we are to stay in business."

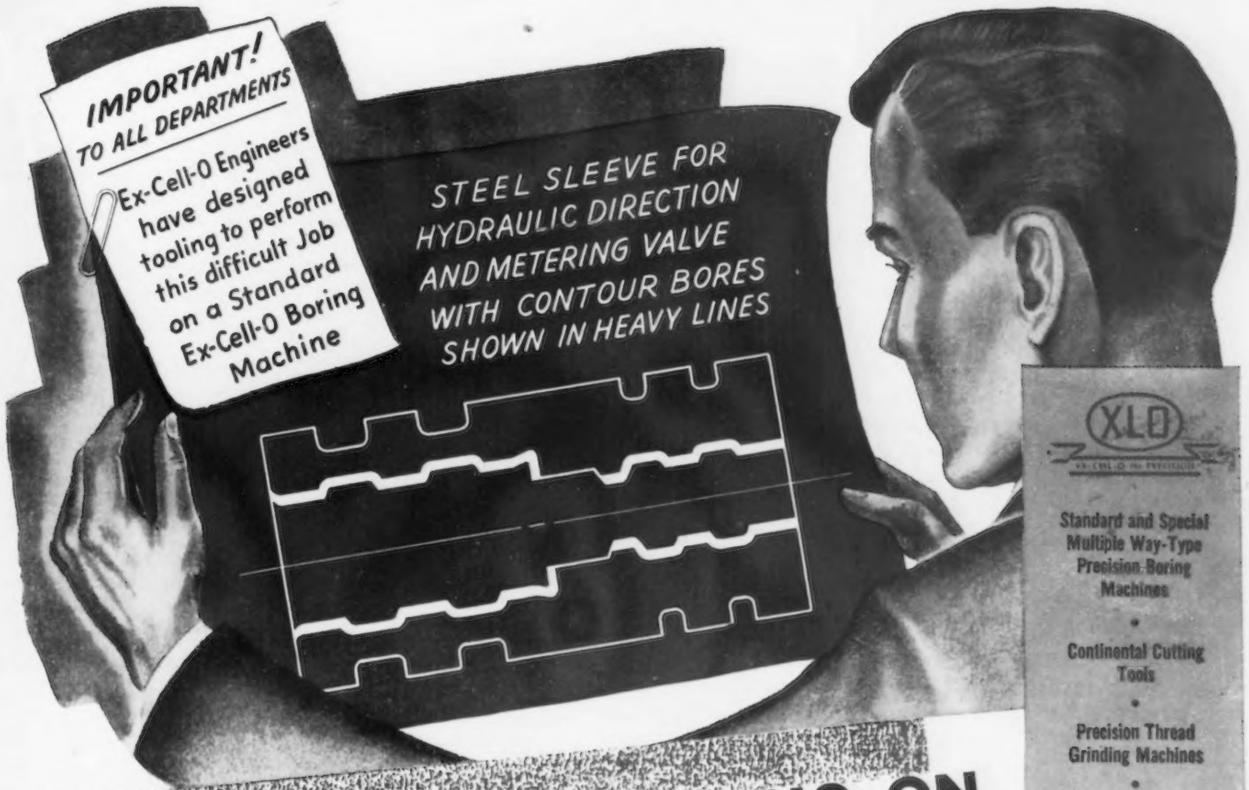
* * *

ALCOA'S plans for the development of ferruginous bauxite deposits in Washington and Columbia counties are progressing, with several carloads of the material having gone to its East St. Louis plant for testing in a pilot plant there. Staff engineers are now reported in Alaska for the purpose of lining up high grade limestone for shipment to this area to be used in the reduction process said to be similar to the Pedersen method. Aluminum Co. of America officials here are making no public statements on the progress of their work, but there is evidence that surveys are already being conducted to determine the marketability of between 150,000 and 300,000 tons of pig iron annually which reduction of these ferruginous bauxite ores would produce along with between 225,000 and 450,000 tons of alumina. Wartime production capacity of aluminum in the entire Pacific Northwest was approximately 250,000 tons. It has been reported that economic recovery

Salt Lake City

• • • CIO United Steel Workers of America have petitioned for an NLRB election in the all but closed Geneva steel plant in the hope of being voted bargaining agent on a plant-wide industrial basis. A hearing was held here recently at the Newhouse Hotel before NLRB Examiner Merle Vincent.

W. Y. Morris, union counsel, sought to establish that the question of bargaining rights at the plant is and has been open since last November. AFL, now bargaining agent on an industrial unit basis, urged dismissal of the petition primarily on the grounds that its contract is still in force. International Assn. of Machinists maintained that an election under present conditions in the plant would be ill-advised. If an election is held, this union proposed three bargaining units—production workers, electrical workers and maintenance workers. International Brotherhood of Electrical Workers AFL also moved for dismissal of the petition and urged a craft union status in the contract with AFL. President Walther Mathesius, representing the company, renewed a motion to dismiss the petition or indefinitely postpone the election and introduced evidence from the operating company's point of view.



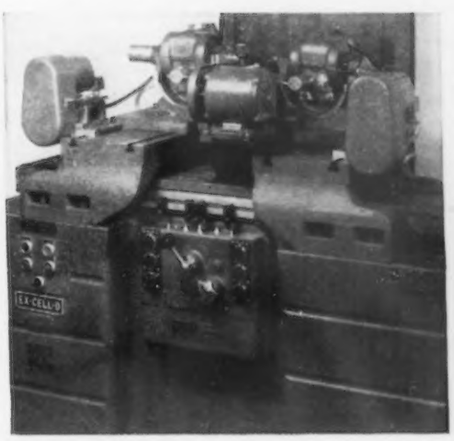
STEPPED CONTOUR BORING ON STANDARD EX-CELL-O MACHINE

Gives You the Economy and Versatility of a Standard Machine with the Efficiency and Low Unit Cost of a Special

Stepped contour bores at both ends of a small steel sleeve for a hydraulic direction and metering valve were to be held concentric within .0002" and concentric with the O.D. within .0005". The problem was solved by using a standard Ex-Cell-O Precision Boring Machine with a specially designed collet which holds the part without distortion, and with two special contour boring devices.

These boring devices, adaptations of the Ex-Cell-O Universal Cam Type Dresser, were used to actuate the tools for the stepped contour bores at both ends within the prescribed limits. The simple machine cycle makes operation easy.

You may not have a problem exactly like the one for which this Ex-Cell-O standard precision boring machine and special tooling were used. Whatever your production problem is, Ex-Cell-O engineers are glad to offer you their years of precision machining experience. Contact your nearest Ex-Cell-O representative, or write direct to Ex-Cell-O at Detroit.



Above: The machine operation is extremely simple because the problems involved were solved by proper tooling. This standard Ex-Cell-O Style 1212-A Precision Boring Machine with special tooling was used for this unusual application.

XLO

Standard and Special Multiple Way-Type Precision Boring Machines

•

Continental Cutting Tools

•

Precision Thread Grinding Machines

•

Precision Lapping Machines

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Broaches and Broach Sharpening Machines

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Multiple Drilling and Other Special Purpose Machines

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Tool Grinders

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Pure-Pak Paper Milk Bottle Machines

See Ex-Cell-O Exhibit at ASTE New Era Exposition Cleveland, April 8-12 Booth No. 1437

46—34

EX-CELL-O CORPORATION, DETROIT 6

of the alumina is dependent upon a ready market for the iron which is produced in the reduction process.

* * *

The three shipyards operated by the Henry J. Kaiser interests in this area are operating on curtailed basis with about 10,000 persons on the payroll as against a peak of approximately 100,000. The Vancouver yard is completing work on C-4 ships; Swan Island yard has been leased by Kaiser Co., Inc., from the Maritime Commission for ship repair work; and Oregon Shipbuilding Corp. is getting underway on three passenger-cargo ships for Aluminum Co. of America.

* * *

Scrap users in this area are interested in the outcome of the bidding, which closes in Washington, D. C., Apr. 1, for three cargo ships tied up in Portland waters which are being offered for sale by the U. S. Maritime Commission for scrapping purposes only. It is estimated that the three over-aged craft will yield between 24,000 and 30,000 tons of scrap. A survey of local dealers indicates a reluctance to bid on these ships because of the present high cost of salvaging the material and the price of **scrap. Number one** heavy unprepared is now being purchased locally for $10.50 a gross ton which is an increase of 50¢ a ton over the previous price.

* * *

Increasing industrialization of the area has brought about more than the usual amount of interest in the efforts of Representative Harris Ellsworth (Oregon) to secure approval for funds with which to continue research into uses of the minerals of the Northwest. The peculiar combinations in which many of the minerals of the area are found, require special study for their recovery, according to Mr. Ellsworth.

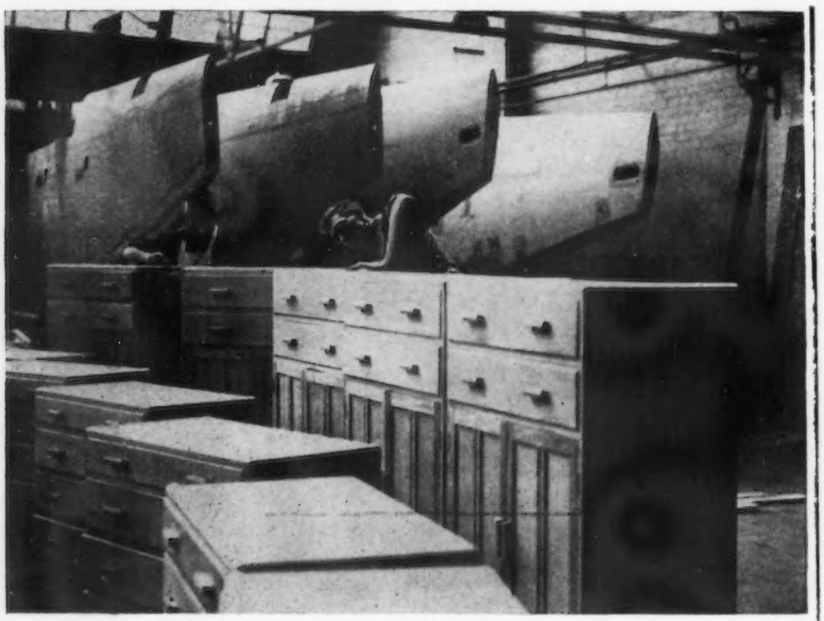
The following appropriations have been requested for Bureau of Mines investigations: Vacuum metallurgy and fusion electrolysis at Albany, Ore., $30,000; magnesium investigation at Pullman, Wash., $25,000; Albany station, $161,000; Pullman station, $16,500; field offices at Spokane Wash., Moscow, Ida., and Helena, Mont., $75,000; electrometallurgy of lead and zinc at Albany, $26,545; electrometallurgy of Pacific Northwest iron, nickel and chrome, $31,785; high phosphate iron, $22,000; production of ductile zirconium from Oregon black sands $36,295; and an electrothermic magnesium plant, $110,000.

THE most optimistic and expansive view of the industrial development of this area is taken by Dr. Paul J. Raver, administrator of the Bonneville Power Administration who stated, "There is a strong indication that the Pacific Northwest must get a bigger supply of hydroelectric power and get it quickly to keep ahead of industrial expansion." Dr. Raver was "hopeful" that the Troutdale aluminum reduction plant may soon again be operating and he cited the fact that Reyonlds Metals Co. and the American Smelting & Refining Co. are both considering the plant. This one unit used 130,000 kw of Bonneville power during its peak operation. The possibility of the Kaiser interests operating the Mead aluminum reduction plant and the Trentwood rolling mill near Spokane with a load of approximately 200,000 kw was also pointed out.

In presenting the budget request before the house appropriations committee in Washington, D. C., Dr. Raver reported that Bonneville's lines lost a load of about 500,000 kw from war contract cutbacks, but that the demand for power from all Northwest sources exclusive of war demands was 125,000 kw greater in December 1945 than it had been in December 1944.

Dr. Raver has stated that he has never been concerned about Bonneville's 500,000 kw excess capacity and that he would like to keep Bonneville's capacity 150,000 kw ahead of the market. "It is good for the Northwest to have ample supplies of power in a reconversion period to be in a position to get new industries and we want to keep this area in that position."

PEACETIME PRODUCTION AGAIN: *British workers at an Enfield, Middlesex, furniture factory put the finishing touches on chests of drawers, which stand alongside of Mosquito aeroplane wings. The factory hopes to produce* 1000 *bedroom suites per week in the near future to fill Britain's needs.*



Net Earnings Increase

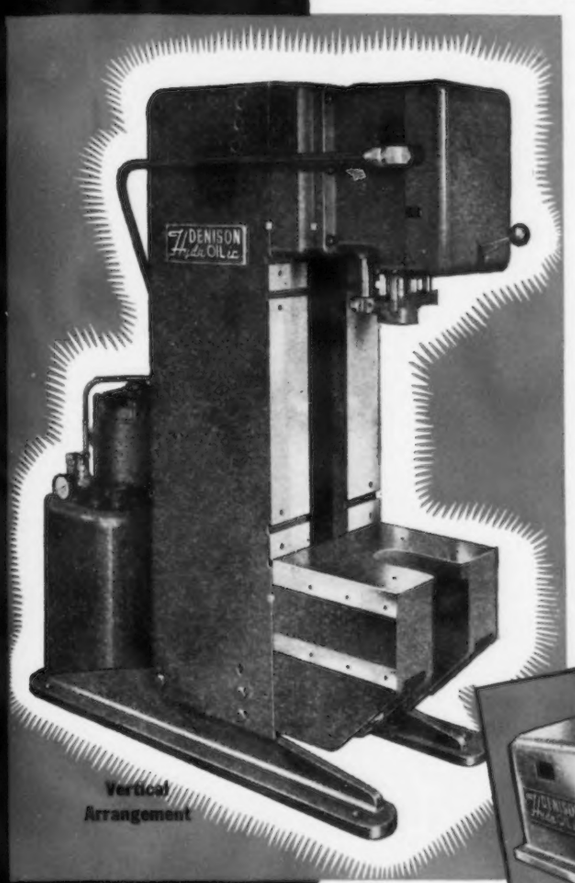
Buffalo

• • • **The Symington-Gould** Corp. reports net earnings of $746,203 for 1945, equal to 74¢ a share, compared with $555,210, or 55¢ a share, in 1944. Net sales for last year totaled $16,690,704 against $19,660,869 in the preceding year.

Appropriation for plant rearrangement and rehabilitation totaled $1,481,902, of which $246,316 was spent at the end of the year; $352,195 was earmarked for improvements at the Depew works, of which $95,452 was expended at the end of 1945.

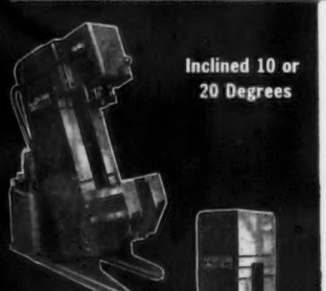
Radically NEW Design

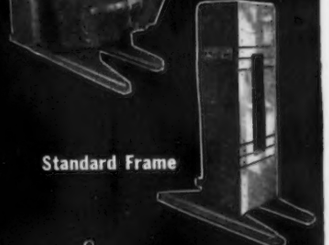
MULTIPLIES PRESS FLEXIBILITY!



MULTI-UNIT Hydroilic PRESS

A news-making improvement in machine tool design! A Denison hydraulic press built in separate, self-contained, specially designed components that achieve two striking advantages! First, they combine into the highly flexible MULTI-UNIT press, which can be set up in a variety of ways to meet many different needs. Second, your engineers can quickly and economically adapt individual MULTI-UNIT components to your own special machines or equipment!





MULTI-UNITS include the Pumping Unit, Power Head, Standard Frame, and Bolster. The Power Head, available in seven models, offers an amazing variety of ram actions, including manual or automatic control, rapid traverse and regulative pressing speed, automatically repeated pressure strokes, automatic ram cycling, and the now-famous Vibratory HydrOILic Pressure. Ram pressures are closely limitable up to 4 or 6 tons. Ram strokes are regulative between ½ inch and 6 inches.

The Standard Frame is drilled and keyed to permit a variety of bolster and Power Head adjustments, and features a choice of legs and "feet" that adapt the press to four different positions—horizontal, vertical, and at 10 or 20 degree inclines. Standard interlocking accessories, such as indexing tables and ejection cylinders, are applicable to these Multi-Units.

Write today for full details on this sensationally new production aid!

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European Letter . . . JACK R. HIGHT

• Organization proceeding for British Iron & Steel Research Assn. . . . Metal Flow Station contemplated as part of program . . . Coating Station under way.

LONDON—Relaxing after the Continental wanderings, I called this week on Sir Charles Goodeve, whom you will recall was last year named to direct the new British Iron & Steel Research Assn. As you can imagine, in the establishment of any such undertaking, his first months on the new job have confined themselves largely to organizational matters, with the result that the basic outlines of the association are now generally definable.

In a country already flooded with more trade associations, institutes, federations, organizations and councils than Superman could list, the exact definition of the need for such a group and the sphere of its intended activities has also been an important task for the new director. It would be difficult to go into an explanation of the functions of the new organization without using the word "rationalization," which I have used here before too frequently in describing postwar industrial activities. The word has been used to the point of triteness but is difficult to replace.

The formation of the association is a rationalizing process because it marks not the beginning of such research activities, but their rearrangement to accomplish their tasks on a more logical plan, as well as the promotion of the new activities. The employment of a full-time staff by the association will not mean the construction of any *single* new research palace to replace the work which has been carried on in the United Kingdom by universities and the technical dept. of the British Iron & Steel Federation, but rather small units to fill the present gaps.

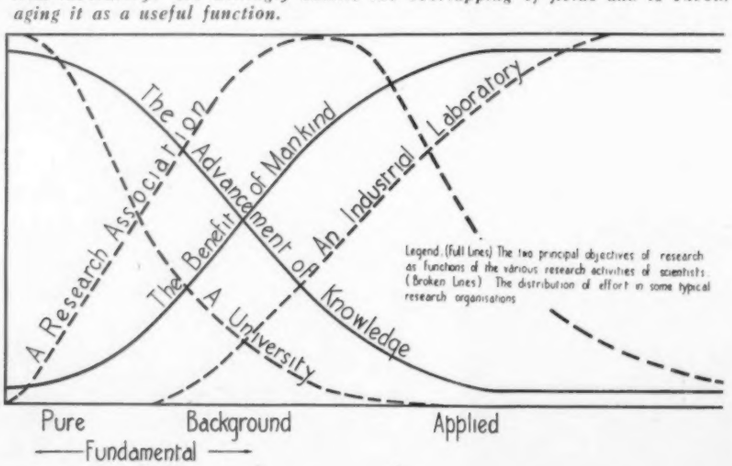
The staff that Sir Charles is employing (the initial plan calls for about 250 full-time people) at the present time will be concerning itself with planning the basic efforts and with providing liaison between the separate activities. Much of the research work will continue to be carried out in exactly the same locations and by the same groups that have been doing the job for many years.

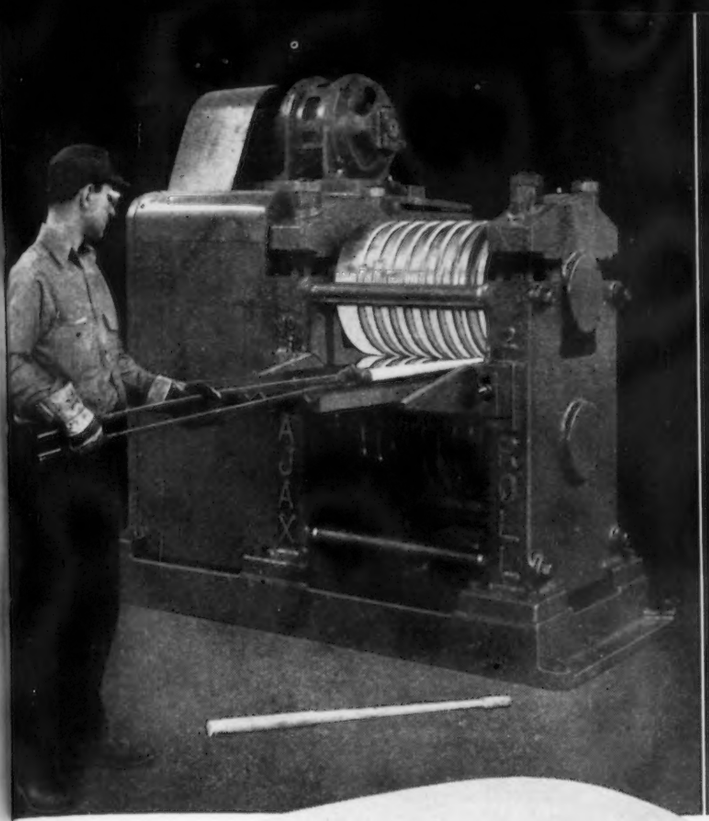
Sir Charles sees the function of the research association as lying between the objective of the university laboratory to "advance knowledge" and that of the industrial laboratory to "benefit mankind." He expresses the hope that the association will be the eventual medium for narrowing the "enormous gap in time" that exists between the discovery of new scientific knowledge and its application. As for fundamental research, he will leave it to the university, unless some project seems likely to be more efficiently carried out in the association's own laboratories. The steel firms will still be expected to carry through new developments to the applied stage and to make their own plant developments.

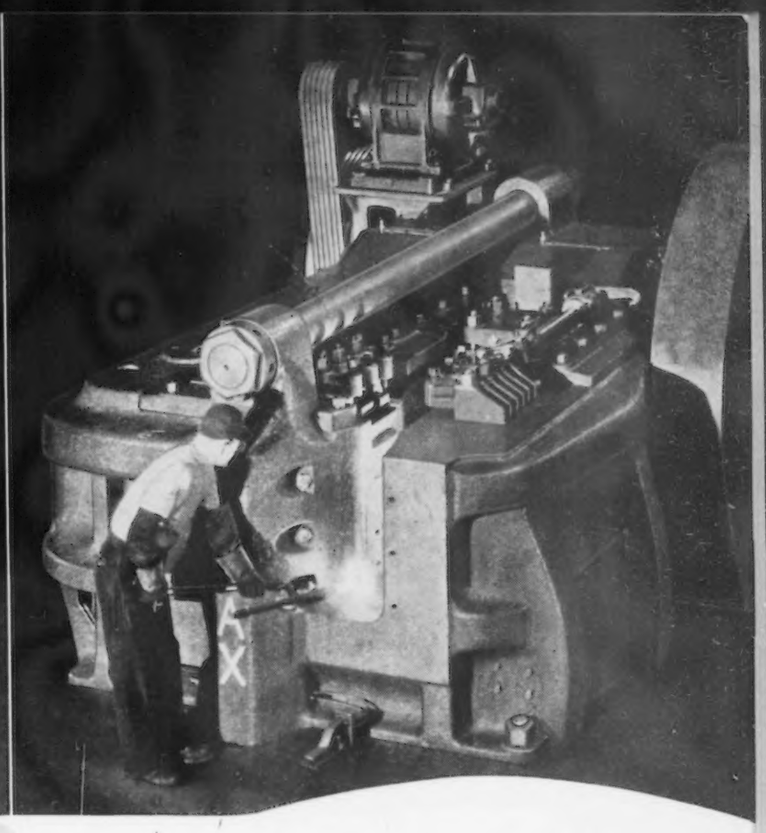
SIR CHARLES F. GOODEVE, *director, British Iron & Steel Research Assn.*

Summed up, he says, "The association is concerned primarily with background or objective research, and with new techniques

RESEARCH COMPROMISE: *As foreseen by Director Sir Charles Goodeve of the British Iron & Steel Research Assn., the place of the new group is between the fundamental efforts of the university, and the applied efforts of the industrial laboratory. He willingly admits the overlapping of fields and is encouraging it as a useful function.*







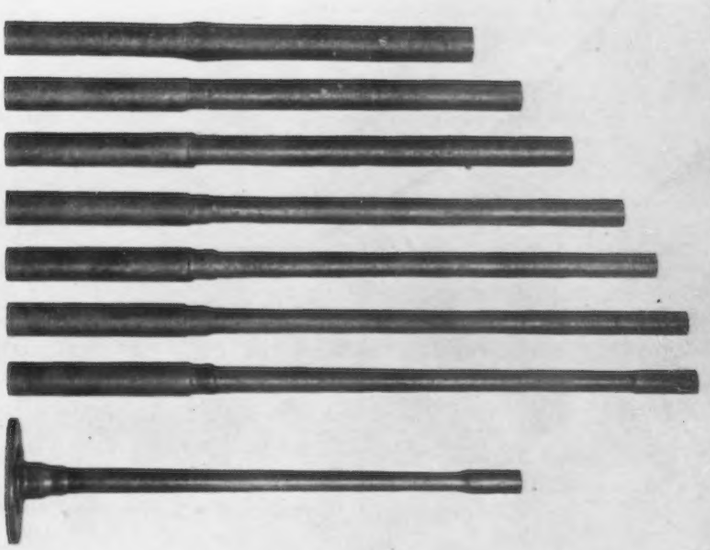
AJAX FORGING ROLLS Taper Rear Axle Shafts

Ready for Flanging on AJAX FORGING MACHINES

AJAX Forging Rolls are used extensively and advantageously in the forging of tapered automobile and truck rear axle drive shafts. The rolls form the tapered section between wheel seat and spline—accurate, smooth and free from seams or flash lines which would start fatigue failures. After straightening, no machining is done on this tapered section.

When called for, the tapered wheel seat can be rolled at the same heat. When a flange is required, the end is reheated and upset accurately and close to dimensions in an Ajax Forging Machine.

Write for Bulletin 91-A



Steps in Rolling a 16 Pound Flanged Axle Shaft

THE AJAX MANUFACTURING COMPANY

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and processes of common interest."

TO carry out the above intentions, the organization is functioning through a council and six divisional sub-councils. Sir Charles makes no secret of his strong determination that all of the activities should be divided functionally, and the divisions reflect this structure. He is making a conscious effort, too, to get a balance of scientific and practical men on each committee.

The ironmaking sub-council will be responsible for all research activities in the fields up to the hot metal stage, steelmaking committee through the ingot, mechanical through the rolling mill processes, steel casting in its special lines, plant engineering its own phases, and metallurgy concerning itself with new steels and consumer approaches to steel research.

In an organization of this scope the council and the sub-councils listed above will be largely administrative functions. Below them Sir Charles is now concerning himself with the maze of committees that will plan specific research projects, and follow them to their conclusion. In taking over much of the work of existing organizations, the rationalization comes into full sway.

Sir Charles sees as the four major functions of the research committees the following:

(1) The determination of what industry wants in the way of specific research.

(2) Guidance for the technical people carrying out the research.

(3) Follow-up of applications of the results of the research.

(4) Tapping the brains of individuals in industry for the benefit of all.

The director confides that the establishment of a committee in the past has been somewhat similar to setting up a "temporary" Washington agency. Regardless of the original intent, it seems that there is almost always good and sufficient reason for it to perpetuate itself. Although the announcement of a preliminary organization chart in the near future may drop a few technical committees that have been existing under some aegis for years but not actually operating, what Sir Charles is most interested in at the moment is arranging for proper cooperation among all those that are functioning, and to bring into the fold of cooperation groups not included in the structure of the British Iron & Steel Federation.

French Automobile Production Up 29 Pct

Paris

• • • **Production of French motorcars for the month of January, 1946, has been increased to 4318 units. This represents an increase of 29 pct over the preceding month, but not more than 23 pct of the average monthly production in 1938. The breakdown of the production follows:**

Type	Monthly Average 1938	December 1945	January 1946
Passenger	15,200	384	597
Trucks	3,500	1623	2230
Small Trucks		1258	1380
Miscellaneous		158	111

He recognizes the basic overlapping of the functions of the six divisional committees, subcouncils and the research committees, and encourages it, along with the interdependence of the various types of laboratories. Keenly aware of the dangers of dividing and subdividing the studies until the left hand never has time to visit the right hand's cubicle, he is planning four different methods of keeping the groups informed on each other's progress (or lack of it).

THE full-time research staff organization will have this coordination between projects as one of its major responsibilities. The organizational structure calling for reports to higher committees with successively broader scope will also foster the interchange of information. Sir Charles is also directing a policy of deliberately appointing common members on committees with relating problems.

The cooperation and coordination inside the committees of the research association represent only one phase of the activities that are being planned. To bring into the studies all interested parties the iron and steel industry research will be in cooperation with the British Refractories Research Assn., British Non-Ferrous Metals Research Assn., British Cast-Iron Research Assn., British Coal Utilization Research Assn., and other similar groups.

In the case of such groups, it is likely that joint committees will be used. In any particular line, such committees would be listed on the charts of both groups, but there would be some agreement in advance that the problem was of more importance to one than the other, and that group would be dominant. Joint technical secretaries would be used to insure complete dissemination of information regarding the progress and conclusions.

Besides cooperating with the research of existing laboratories, Sir Charles is also working out plans for new research stations, in some measure comparable with the Corrosion Testing Station already in existence. As a center of field investigations on the subject the station has in turn out-stations in various parts of the United Kingdom, as well as abroad, and the assistance of independent workers in the field, who also receive support from the association.

Cooperation of the Admiralty, the Shipbuilding Research Assn., and the railways in the corrosion studies which have been carried out and are under way will serve as a pattern for the development of future inter-industry coordination in other lines.

A new Coatings Research Station is now being set up on a similar basis at Swansea, in South Wales, on the same grounds with the University there. A building has been obtained for the purpose, and Sir Charles tells me that it will be a going concern within the next three or four months. The organization at Swansea will have the advantage of cooperation with the university laboratory, although an independent group. Senior officers in the research staff will be honorary members of the university staff.

His plans are for the Coating Station to specialize in all problems concerned with metallic

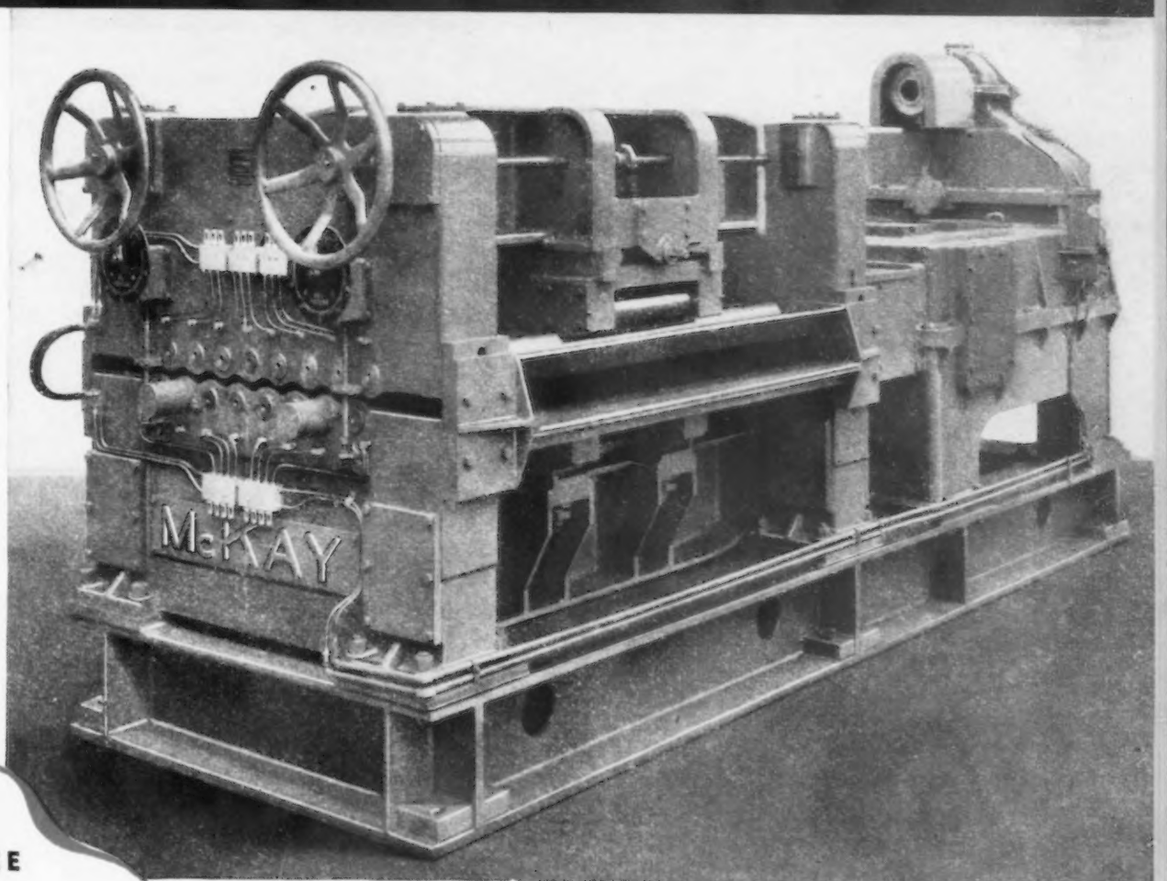
(CONTINUED ON PAGE 112)

McKAY

BACKED-UP ROLLER LEVELERS

FEATURES

- Compact design reduces required floor space.
- All adjustments are readily accessible to the operator.
- Accurate indicating dials are provided for the screwdowns.
- Alloy steel Helical gears are used throughout—fully enclosed and running in oil.
- Drive is through Universal couplings.
- One-shot lubrication system (Optional.)
- Rugged construction insures continuous performance and low maintenance cost.



PERFORMANCE
RUGGEDNESS
PRECISION &
SAFETY

THE McKAY Backed-Up Roller Leveling Machine has extraordinary rigidity because its small diameter work rolls are supported by backing-up rolls. This type of leveling works the sheet more thoroughly.

Sheets processed on this type of leveler are strain relieved to a greater extent and have far superior stamping and drawing qualities than those processed by the ordinary leveler.

The **McKAY MACHINE** *Company*

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

PERSONALS

o o o

• **H. M. Knobloch** has been appointed district sales manager of the new sales office established in Indianapolis by Jones & Laughlin Steel Corp. Since October 1944 he has been assistant district sales manager in Cincinnati. **R. G. Scoggins** has been appointed district sales manager in Los Angeles, succeeding **T. W. Bell,** who has been appointed special sales representative in Los Angeles. Mr. Scoggins has been associated with the J & L district sales office in Memphis. **W. S. Wainwright,** for the past 5 yr a salesman in the wire sales dept. in Pittsburgh, has been named district sales manager in San Francisco. **W. L. O'Connell** has been appointed resident manager of sales in South Bend, Ind., having been resident manager of sales in Indianapolis since 1942.

• **Wayne R. Spahr** has been appointed advertising manager for the Jessop Steel Co., Washington, Pa. He has been associated with the company for the past 11 yr in various departments, including production, cost, and advertising.

• **Thomas F. O'Brien** has recently been appointed metallurgist on the staff of the Kali Mfg. Co. of Philadelphia and will have charge of sales and engineering on the metallurgical chemicals manufactured by our concern.

• **P. J. Patton, Jr.** has been recently appointed regional manager by the Industrial Div., Ransome Machinery Co., Dunellen, N. J., a subsidiary of Worthington Pump & Machinery Corp., with offices in Chicago. He is in charge of sales in the Middle Western area, including such industrial centers as Chicago, Detroit, Cleveland, and St. Louis, and will also assist in solving work and welding positioning equipment problems for Ransome distributors and their customers. Before becoming associated with Ransome, he was Eastern area manager of the Welding Equipment Div. of A. O. Smith Corp., Milwaukee.

• **G. E. Troutman** has been promoted from assistant division sales manager to division sales manager, Rocky Mountain Div., Colorado Fuel & Iron Corp., Denver. Mr. Troutman has been with CF&I since 1932.

• **Paul J. Bastian** has been appointed vice-president in charge of manufacturing for Tyson Bearing Corp., Massillon, Ohio. He recently resigned his position as production manager of Watson Flagg Machine Co., Paterson, N. J., to assume his new duties with Tyson.

• **J. S. Tatman** has been elected chairman of the board and **John Avery,** president and general manager of Roots-Connersville Blower Corp., Connersville, Ind., one of the Dresser Industries. Mr. Tatman has been with Roots-Connersville since 1902. He is a vice-president of the Compressed Air & Gas Institute. Before becoming president of Roots-Connersville, Mr. Avery was manager of the blower and compressor dept. of Allis-Chalmers Mfg. Co.

• **Welles V. Moot,** Buffalo attorney, has been elected president of Sylvanite Gold Mines, Ltd., to succeed the late Edward L. Koons.

• **Daniel Wolfred** has been appointed works manager for the Aireon Mfg. Corp., Kansas City, Kans., and **Arthur E. DesNoyers** has been named director of procurement.

• **John P. Tansey** has been appointed district representative in charge of the Pittsburgh office of J. A. Zurn Mfg. Co., Erie, Pa. He has been associated with Zurn for several years in the capacity of product design engineer. **Earl Morris,** formerly with the Crane Co., has been appointed district representative in charge of the Los Angeles office. **Thomas A. Kennedy,** sales and design engineer for Zurn, has been made regional engineer for the New York factory office. **Harold Bergman** has been appointed district representative in charge of the Cleveland office, and **J. Howard Butcher,** district representative in charge of the Philadelphia office.

• **Orra K. George,** purchasing agent of Wickwire Bros., Inc., Cortland, N. Y., has retired, and **Lyman G. Wickwire,** recently returned from service with the U. S. Navy, has been appointed purchasing agent.

• **W. C. Dabney** has been elected president of the Jones-Dabney Co., Louisville. **A. W. Bornhauser** has been elected vice-president and general manager, and **J. C. Wilcox,** vice-president and director of sales. Other vice-presidents elected were: **E. J. Probeck, W. S. Stark, C. W. Slocum,** and **L. V. Cartwright. E. L. Pangborn** has been named treasurer; **F. H. Volk,** secretary and assistant treasurer, and **E. C. Beck,** assistant secretary.

• **R. F. Muller,** sales engineer with the New Orleans district office of the Allis-Chalmers Mfg. Co., Milwaukee, has been promoted to assistant manager of the office under F. W. Stevens, manager. Mr. Muller has been with Allis-Chalmers since 1920.

• **Charles R. Reeves** has been appointed works manager of Kalamazoo Stove & Furnace Co., Kalamazoo, Mich.

• **C. T. Evans** has been appointed consulting engineer, and **C. W. Kuhn** and **R. A. Millermaster,** assistant managers of development of Cutler-Hammer, Inc., Milwaukee. These three men have been members of the development dept. for some years.

• **George W. Bantzhaff** has been appointed sales representative of the Barrows Lock Works, North Chicago, for the states of Michigan, Ohio and Indiana, and some of the larger cities bordering on this area.

• **Dr. Noel C. Jamison,** research physicist, has joined Philips Laboratories, Inc., Irvington, N. Y., as division chief in charge of electroacoustics.

• **Charles T. Zavales** has joined the Medical X ray Div. of North American Philips Co., Inc., Dobbs Ferry, N. Y., where he will occupy the post of technical commercial advisor. He was formerly with Westinghouse Electric Corp.

• **Severn W. Kittredge** has been appointed manager of operation of Brainard Steel Corp., Warren, Ohio, succeeding **Richard F. Herr,** resigned. Mr. Kittredge spent most of his business career with Talon, Inc., in an operating capacity.

• **A. Lightfoot Walker** has been appointed executive assistant to the president of Rheem Mfg. Co., and will make his office at the eastern headquarters of the company in New York. Mr. Walker has served as general manager of Rheem Mfg. Co., Pty., Ltd., Australia, since the formation of that subsidiary in 1937. **A. B. Taylor** of Sydney succeeds him there.

• **William H. Hugus** has been appointed manager of sales, Caspers Tin Plate Co., Chicago. He was formerly employed in the Tin Plate Div. of Carnegie-Illinois Steel Corp. in Pittsburgh.

• **F. B. Hornibrook,** nationally known authority on concrete and concreting materials, has been appointed assistant director of research of the Master Builders Co., Cleveland.

• **William B. Bauzenberger** has been appointed manager of sales of the Apex Alkali Products Co., Philadelphia.

• **Philip L. Coddington** has been appointed manager of sales, Welded Alloy Tube Div., the Carpenter Steel Co., Kenilworth, N. J., succeeding **Alvin K. Smalley**, who died recently.

• **John D. Hall,** with Braeburn Alloy Steel Corp., Braeburn, Pa., for 15 yr, and in the tool steel business for almost 35 yr, has resigned.

• **Leonard M. Freeman** has been appointed manager of the newly established works laboratories of the B. F. Goodrich Co., Akron, Ohio, which will handle technical service, development and training of technical personnel. In the group are the general chemical laboratory, raw materials inspection and development dept. and physical testing laboratories. **Thomas J. Cain, Jr.** has been appointed director of safety for all Akron plants of the company.

• **Raymond W. Andrews** has been appointed merchandising manager in the Radio Div. of Sylvania Electric Products, Inc. His office at present is in Williamsport, Pa. He will specialize in the development and sale of special products to be marketed through radio parts distributors.

JOHN MAY (left), assistant to the president, and HARRY M. FRANCIS, (right), vice-president in charge of sales, American Steel & Wire Co., whose appointments were announced in the Mar. 14 issue.

• **Lars E. Ekholm** has joined the metallurgical engineering staff of the Climax Molybdenum Co. and will be located in the company's New York office. Mr. Ekholm has been a metallurgist with the Aluminum Co. of America, metallurgist and open hearth superintendent with Harrisburg Steel Corp. and metallurgist with Henry Disston & Sons, Inc. For the last 7 yr he has been metallurgical engineer for the Alan Wood Steel Co.

• **Albert T. Warman,** general superintendent of the Worcester Taper Pin Co., has been made chairman of the American Society of Tool Engineers, Worcester chapter.

• **J. Hugh Bolton** has been made president of the Whitin Machine Works, Whitinsville, Mass., to succeed **E. Kent Swift,** who has been made chairman of the board and who remains as treasurer.

• **J. J. Raskob** has resigned from General Motors, New York, as a member of the board and a member of its bonus and salary committee.

• **Harold Parker,** service supervisor at the Ford Motor Co. Memphis branch, has been appointed assistant manager.

• **J. W. Alexander,** formerly with Chrysler Corp., has joined Kaiser-Frazer Corp., Willow Run, Mich., as assistant service manager.

• **S. B. Knutson** has been appointed general superintendent of the Flexsteel Div. at the Ambridge plant of National Electric Products Corp., Pittsburgh. He was a metallurgist and production control foreman at the Gary plant of Carnegie-Illinois Steel Corp. for 7 yr, and in 1941 became chief metallurgist for McQuay-Norris Mfg. Co., St. Louis. For the past 2 yr he has worked on the engineering and development of corronizing for Standard Steel Spring Co., Coraopolis, Pa. Assisting Mr. Knutson is William Jung.

• **Dave Blount** has rejoined the Magnus Chemical Co., Inc., of Garwood, N. J., as assistant sales manager. Mr. Blount left Magnus in 1937 and has more recently been with Red Star Yeast & Products Co.

• **John S. Shafer** has joined Hydraulic Machinery, Inc., of Dearborn, Mich., as sales engineer. For the past 5 yr Mr. Shafer has been in charge of engineering at Robbins Engineering Co. and previously he was at Dodge Div., Chrysler Corp.

• **W. W. Scull** has been named production manager of plants, B. F. Goodrich Chemical Co., Cleveland.

• **Col. Rufus W. Putnam,** wartime Los Angeles district engineer, U. S. Army Engineers, has been appointed to head the Los Angeles office of Kaiser Engineers, Inc.

• **Lt. Sid Goldberg** has become associated with Electric Equipment Co., Rochester, N. Y., as assistant to Mr. Norry in the buying and selling of new and rebuilt equipment.

• **Milton T. Satter** has been appointed roll engineer in the Roll Sales Div. of the Aetna-Standard Engineering Co., Youngstown, Ohio.

• **Dr. Jerome C. Hunsaker** has been elected to succeed **O. Max Gardner,** new Under-Secretary of the Treasury, as a director of the Sperry Corp., New York, and the Sperry subsidiaries, Sperry Gyroscope Co., Inc., Ford Instrument Co., Inc., Vickers, Inc., and Wheeler Insulated Wire Co.

• **John F. Merriam,** vice-president of Northern Natural Gas Co., Omaha, Neb., has been elected a director of McCord Corp., Detroit.

• **Edward A. Carney** has been appointed sales representative for the Lake Erie Engineering Corp. of Buffalo in the Detroit district, and **H. Vander Schilden** has been appointed sales representative for the corporation in the Chicago district.

• **Sigmund A. Czarnecki** has been appointed production engineer for Hamilton Standard Propellers Div., United Aircraft Corp., East Hartford, Conn., and will be in charge of all activities of the tool and equipment engineering depts., which have been combined under his direction. **Ermano Garaventa,** who has been in charge of the company's production of its new hollow-steel blade, has been promoted to process development engineer. **A. F. Mannella** is to be in charge of hub production, plating, heat treating and assembly, assisted by **A. V. Mayo** and **Adolph Hartig** as general foremen of the hub dept. **W. J. Kamerer** has been named assistant production superintendent in direct charge of operations at the West Hartford plant with the assistance of **Floyd White** as general foreman. **C. A. Krause** is now production superintendent for blades in direct charge of all blade manufacturing with the assistance of **Harold Solum** as general foreman for aluminum blades and **Maxwell Pounder** as general foreman for steel blades.

HOWARD H. WILDER, chief metallurgist, Foundry Div., Eaton Mfg. Co.

• **Howard H. Wilder** has been appointed chief metallurgist of the Eaton Mfg. Co. Foundry Div., Detroit. Mr. Wilder was formerly with the Wilson Foundry Machine Co., and has been affiliated with the Vanadium Corp. and General Motors.

• **E. W. Husemann** has recently joined the metallurgical staff of the La Salle Steel Co., Chicago, where he will be engaged in metallurgical and engineering development prospects. Prior to joining the La Salle organization, Mr. Husemann served as metallurgist with the Copperweld Steel Co. and the Republic Steel Corp.

• **Edgar G. Herrmann,** veteran radio sales and advertising executive and former assistant vice-president of the Zenith Radio Corp., has been named sales manager of the Westinghouse Home Radio Div., Sunbury, Pa. He recently resigned as sales manager of the Emerson Radio & Phonograph Corp. **David W. R. Morgan,** manager of the Steam Div. of the Westinghouse Electric Corp , East Pittsburgh, has been appointed general manager of the entire South Philadelphia works. His responsibilities will include general supervision of the Aviation Gas Turbine Div., and the Attica, N. Y. plant of the stoker dept. He will retain direct management of the Steam Div.

• **Will L. Corbett** has been appointed superintendent of industrial relations, Waukegan, Ill., works, American Steel & Wire Co. An employee of the company since 1915, Mr. Corbett came to Waukegan works 8 yr ago as personnel supervisor, and was made assistant industrial relations supervisor in 1940, the position he held prior to his new appointment.

• **J. B. Martin** has been appointed controller of Mullins Mfg. Corp., Salem, Ohio. **John P. Hochadel** has been promoted to assistant controller. **Royal L. Schiller** has been advanced to post of staff legal counsel, and **Arthur S. Greenamyer** has been named chief cost accountant to fill the position vacated by Mr. Martin.

• **Dunbar L. Shanklin,** with Dewey & Almy Chemical Co., Cambridge, Mass., since 1924, has been appointed to the newly created post of assistant director of the research laboratories, in charge of container sealing research. **George W. Blackwood** is succeeding Mr. Shanklin as manager of the Container Div.

• **Harry M. Genger** has been appointed superintendent of transportation and labor of Sharon and Farrell works of the Sharon Steel Corp., Sharon, Pa.

• **W. S. Colson** has been appointed sales representative by Gibson Electric Co., Pittsburgh. His territory includes Missouri, Kansas, Arkansas, and Oklahoma.

• **C. W. Link** has been appointed sales manager of Coldwell-Philadelphia Lawn Mower Div. of Portable Products Corp., Newburgh, N. Y.

• **M. J. Gross** has been named manager of engineering of General Electric X-Ray Corp., Chicago.

• **William F. Newton** has been appointed manager of research and development for the Columbia Chemical Div. of the Pittsburgh Plate Glass Co., Pittsburgh. He joined the division's research staff in 1941 and was made division superintendent in charge of synthetic resins and related organic products 2 yr later.

• **Elmer B. Carter** has been elected vice-president of the Wheeling Corrugating Co., Wheeling, W. Va., to succeed the late John H. Robinson. He will be in charge of sales.

• **F. C. Messaros** has been appointed chief engineer of the American Engineering Co., Philadelphia, and **J. S. Frame** has been appointed chief draftsman. Both men have been with the company for over 20 yr.

• **Harold F. Brandt** has been elected president and general manager of the Dobbins Mfg. Co. of Elkhart, Ind., and N. St. Paul, Minn., succeeding **H. E. Brandt**, who becomes chairman of the board of directors and treasurer.

• **James F. Hoffer** has been appointed chief engineer of Superdraulic Corp., Dearborn, Mich. Until lately he has been chief research engineer of Hydraulic Machinery, Inc., and he will continue with the latter organization as engineering consultant.

• **J. P. Henry** has been appointed eastern zone manager in charge of district engineering offices in Hartford, Conn., Newark, N. J., Philadelphia and Washington for Ampco Metal, Inc. of Milwaukee. Zone headquarters are in Hartford. The Newark district office will be handled by **A. M. Smith** and **J. W. Nebel. W. F. Taff** has been transferred from the Cincinnati district office to Indianapolis where he will continue as field engineer.

• **Ben C. Carter**, controller, and **William de Back**, vice-president and manager of the Anderson-Barngrover Div. of Food Machinery Corp., San Jose, Calif., have been elected to the corporation's board of directors and executive committee.

• **Henry B. Bryans**, executive vice-president of the Philadelphia Electric Co., has been elected a director of the Midvale Co., Philadelphia, to succeed George E. Smith, deceased.

• **Albert Woodley** has been made Cleveland-Detroit district manager of the Nox-Rust Chemical Corp., Chicago, succeeding **E. J. Johnson**, resigned.

B. L. RAWLINS, general attorney, Carnegie-Illinois Steel Corp.

• **B. L. Rawlins** has been appointed general attorney of Carnegie-Illinois Steel Corp., Pittsburgh, U. S. Steel subsidiary. Until his present appointment he served with the law dept. of the U. S. Steel Corp. of Delaware.

• **Gordon G. Lloyd** has been named general superintendent of the Wickwire-Spencer plant of the Colorado Fuel & Iron Corp. in Buffalo succeeding Alwin F. Franz.

• **S. K. Towson**, president, Elwell-Parker Electric Co., Cleveland, has been elected president of the Materials Handling Institute in Cleveland, succeeding L. J. Kline, general manager, Mercury Mfg. Co., Chicago.

• **Robert G. Leary** has been appointed a sales representative of Eastern Stainless Steel Corp., Baltimore. His territory will include Northern New Jersey, the five boroughs of New York City, and Orange, Putnam, Rockland and Westchester counties in New York State. Prior to service in the U. S. Army, Mr. Leary was connected with the corporation in the Chicago office.

• **Walter E. Brian**, for several years advertising and sales promotion manager for Northwestern Steel & Wire Co., Sterling, Ill., has joined the staff of Gebhardt & Brockson, Inc., Chicago, as an account executive.

• **James Glass, Jr.** has been promoted to vice-president in charge of sales of the J. A. Zurn Mfg. Co., Erie, Pa. He has been associated with Zurn for more than 20 yr. **John H. Schmid**, with the company for 7 yr, has been named vice-president in charge of engineering, and **Robert M. Campbell** has been appointed manager of advertising and sales promotion.

• **Dr. L. A. Philipp**, chief engineer, Kelvinator Div., Nash-Kelvinator Corp., Detroit, has been elected vice-president of the corporation in charge of engineering, Kelvinator Div. He joined Kelvinator in 1927 as director of research.

• **Harry A. Armbright** has been appointed manager of sales training for Youngstown Kitchens, with headquarters at the factory in Warren, Ohio.

• **Harold S. Meyer** has been appointed patent counsel, heading the patent law dept. of B. F. Goodrich Co., Akron, Ohio.

• **Charles R. Newpher** and **Frank A. Yusek** have been appointed production manager and factory superintendent, respectively, of the Ivanhoe Div. of the Reliance Electric & Engineering Co., Cleveland.

• **George H. Cherry**, formerly with American Bosch Corp., has joined the Anderson Co. in its Detroit office.

• **Edward R. Broderick** has joined the sales engineering force of the Advance Pressure Castings, Inc., Brooklyn, and has been assigned the New York, Brooklyn, and Long Island territory.

• **G. H. Gaites**, regional sales supervisor of the Cleveland and Pittsburgh sales territories of the Bristol Co., has been appointed district manager of the company's New York office.

• **Robert H. Ehret** has joined the headquarters sales staff of the Electric Products Co., Cleveland, and will be responsible for handling headquarters sales negotiations.

• **Raymond A. Durand**, formerly assistant sales manager of Edward Valves, Inc., East Chicago, Ind., has been advanced to the position of sales manager.

• **Lt. Col. J. Albert Roesch,** who served as assistant chief and later as chief of the Chicago ordnance district's ammunition branch prior to his release from active duty, has become president of World Trade, Inc., recently formed in Chicago. **John H. Crosby,** formerly western sales manager of Universal Concrete Pipe Co., is vice-president.

• **W. C. Swalley** has been elected vice-president in charge of sales of the Wellman Engineering Co., Cleveland, and **A. J. Lichtinger,** vice-president, has been elected a member of the board of directors.

• **John G. Lee** has been named manager of the Sioux City, Iowa, branch of the Westinghouse Electric Supply Co. **Ralph H. Sroufe** has been transferred to Portland, Ore., as manager of Westinghouse Electric in that city, and **Robert T. Rogers** will succeed Mr. Sroufe at Des Moines, Iowa.

• **John K. Hodnette** has been named manager of Westinghouse Electric Corp.'s Transformer Div. at Sharon, Pa. Mr. Hodnette, who has been engineering manager in that division for the past 6 yr, assumes the duties formerly held by the late H. V. Putman, company vice-president in charge of the Transformer Div.

• **Robert L. Reeves** has joined the Replacement Tire Sales Div. of the B. F. Goodrich Co., Akron, Ohio, following nearly 4 yr in the Navy. Mr. Reeves entered the rubber industry in 1930 and has held a number of executive and administrative posts.

• **M. R. Denison** has been promoted to director of purchases of Bendix Home Appliances Inc., South Bend, Ind. **Henry A. Jewell** has been named to succeed Mr. Denison as purchasing agent, and a veteran employee, **L. F. Kedzie,** has been appointed assistant purchasing agent.

• **Norwood D. Craighead** has been appointed assistant sales manager of Bendix Home Appliances, Inc., South Bend, Ind. He will also continue to serve as retail merchandising manager and director of sales training until his successor is appointed.

• **Dr. Harlan L. Trumbull,** director of synthetic rubber and textile research of B. F. Goodrich Co., Akron, Ohio, will serve as manager of the Research and Development Div., synthetic rubber dept., Rubber Reserve Corp., in Washington, on a temporary basis. In Dr. Trumbull's absence, **E. A. Willson** will be acting director of synthetic rubber research and **Dr. R. A. Crawford,** acting director of textile research.

• **John G. Shirley,** general superintendent of the James Hunter Machine Co., North Adams, Mass., has resigned, effective early March, to join the engineering staff of the Behr Manning Corp., Troy, N. Y., with whom he was associated before joining the Hunter company.

• **Dr. Frederick Port** has been appointed chief engineer of Cribben & Sexton Co., Chicago. Before entering the Army in 1942, he was associated with the Republic Steel Corp. as head of the combustion engineering dept.

• **Ira R. Ogilvie,** merchandising consultant before he went into the army, has been appointed sales promotion and advertising manager of the George Gorton Machine Co., Racine, Wis.

• **Charles O. Slaby,** formerly with the OPA at Washington, has been appointed assistant sales manager of National Enameling & Stamping Co., Stover & Heater Div., Milwaukee.

• **William F. Sievert,** with the Milwaukee Stamping Co. for many years, has been elected vice-president of the Badger Engraving Co., Milwaukee, which has added a stamping division to its business.

• **John S. Devey** has been appointed director of training in the Mfg. Div. of the Crosley Corp., Cincinnati. **Tye M. Lett, Jr.** has been appointed director of exports of Crosley. He has been assistant export director since last July when he joined the organization, and is succeeding **J. W. DeLind, Jr.,** who recently resigned.

• **Robert W. Ritchie** has joined Bliss & Laughlin, Inc. in the capacity of metallurgical engineer, and will be located at the Harvey, Ill. plant, available to the territory served from there. He has been connected with the Carnegie-Illinois Corp. for the past 9 yr.

• **William A. Barnstead** has recently been appointed production manager of the Still & Sterilizer Div. of Aetna Scientific Co., Everett, Mass. Mr. Barnstead was formerly co-ordinator at Market Forge Co.

• **A. A. Orne** has been appointed general service manager of the General American Aerocoach Co., Motorcoach Div. of General American Transportation Corp., Chicago.

OBITUARY...

• **Harry E. Fuller,** 50, personnel director of Cleveland Graphite Bronze Co. and a member of the firm since its organization in 1919, died Feb. 24.

• **Albert L. Pompee,** owner of the Pompee Die & Tool Engineering Co., Detroit, died recently.

• **Frank L. Boutet,** 52, president of the Farnham Mfg. Co., died Mar. 10 at his home in Kenmore, N. Y.

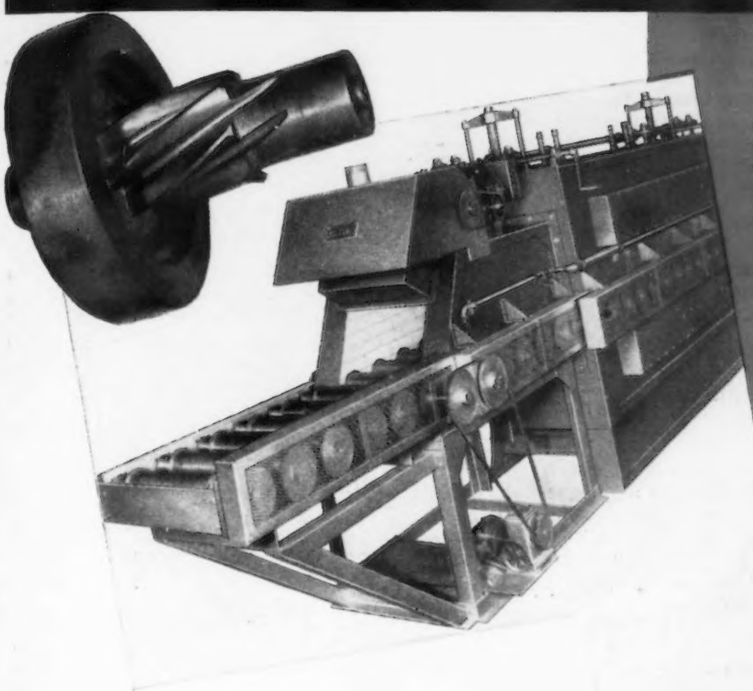
• **Joseph B. Crane,** 66, export manager of Combustion Engineering Co., New York, died suddenly of a heart attack at his home in Bridgewater, Conn., on Mar. 9.

• **Adolph P. Kissel,** 76, one of the founders of the Kissel Motor Car Co., Hartford, Wis., died Feb. 27.

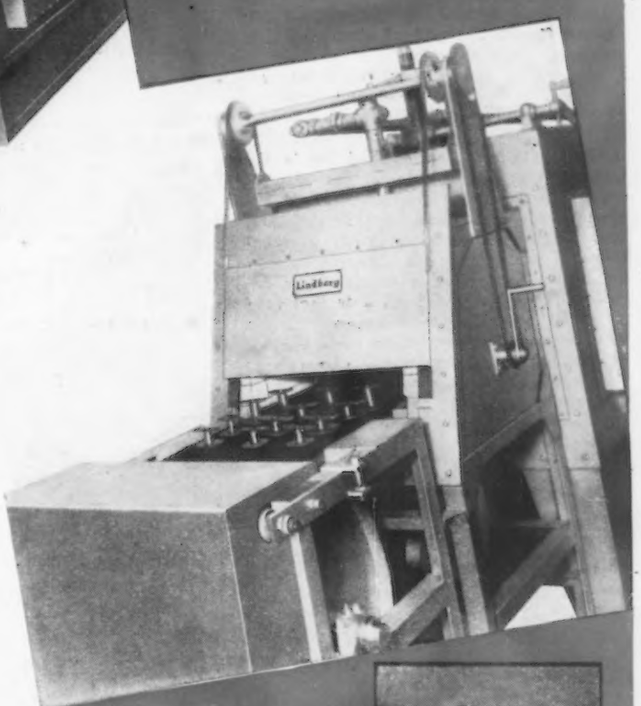
• **Joseph W. McLean,** for 44 yr associated with the Simonds Saw & Steel Co., died in Philadelphia on Mar. 7, from an extended illness which began shortly after his retirement on Nov. 1, 1945 as president of Simonds Abrasive Co. of Philadelphia.

• **Carlton N. Aborn,** 72, president and founder of Laminated Shim Co., Inc., Glenbrook, Conn., died Mar. 3. Mr. Aborn founded the company in 1913, the original plant being located in New York City.

There's A Versatile LINDBERG Furnace to Production Braze *Continuously* Any Assembly



Left: Roller Hearth Continuous Production type (available in 3 sizes) for heavy loads. The fourteen-pound spiral gear assembly (8" in dia., 2" thick) shown, is typical of work which this furnace will efficiently handle.



Above: Mesh Belt Conveyor Continuous Production type (available in 3 sizes) for lighter loads which do not exceed 7 pounds per square foot. The impeller fan shown is a typical example.

Designed for copper-brazing at high temperature, loads from 130 to 2300 gross pounds an hour—these Lindberg Furnaces efficiently meet the needs of every continuous production job, including:

- **Low temperature silver brazing**
- **Bright annealing**
- **Sintering of powder metals**

No Production Delays—Elements are easily replaced without cooling the furnace down. With a top capacity of 2500° F., the AT-type Globar heating elements operate at the 2050° F. copper brazing level at considerably less than critical temperatures. This effectively prolongs their life.

Cooling Rates are Automatically Controlled to meet the needs of the work being treated. Proper temperature level of water in cooling chamber is maintained. An Aquastat controls a Solenoid Valve which regulates the flow of water in the jacket.

Variable Speed Drive flexibly meets the needs of various jobs.

A Selection of Controlled Atmospheres is available.

Metal assemblies typical of those which can be produced at drastically lowered costs in these furnaces are illustrated. Let our engineers give you the complete story. LINDBERG ENGINEERING COMPANY, 2452 West Hubbard Street, Chicago 12, Illinois.

LINDBERG
FURNACES

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

Dear Editor:

GAS PRESSURE FEEDER HEADS

Sir:

Referring to the article "High Pressure Feeding of Static Molds," by Jazwinski and Finch in the Jan. 10 and 17 issues, is there a company in the United States that has the rights to license the use of this process?

A. G. LINLEY
Chemical Engineer
Locomotive Finished Material Co., Atchison, Kans.

Sir:

We are very much interested in the article "High Pressure Feeding of Static Molds," by Jazwinski and Finch and would like to obtain information on the patent status of this process.

E. R. OESCHGER
Production Engineer
Symington-Gould Corp., Rochester

● Patents have been applied for in the United States as well as other countries, we are advised by K&L Steelfounders and Engineers, Ltd., but arrangements for licensing have not yet been completed. A representative of the company is expected to visit the States this spring and is planning on visiting THE IRON AGE office at that time to advise us of license arrangements. As soon as such information is available we will publish it. The company also reports that they have had some promising results in experiments with gas pressure feeder heads applied to cast iron and nonferrous work.—Ed.

HARD SURFACE ALLOY

Sir:

On p. 55 of the Feb. 7 issue mention is made in paragraph 7 of "Newsfront" of a new hard-surfacing alloy for acetylene torch application. Can you give me the name and address of this manufacturer?

H. L. ANTHONY
Senior Fellow
Mellon Institute of Industrial Research Pittsburgh

● The new hard-surface alloy for acetylene torch application to steel which contains tantalum-columbium carbide is a product of the Fansteel Metallurgical Corp. of North Chicago, Ill. Fanweld is the name.—Ed.

ROLLED ALUMINUM BRONZE

Sir:

We are planning to make an aluminum bronze billet of special composition, which we would like to have rolled into sheets. The length and width of the sheet is immaterial, but we desire a thickness of 0.020 to 0.060 in. So far we have been unable to locate anyone that does commercial rolling of aluminum bronze. Therefore, we are taking the liberty to ask if you can possibly supply us with the names of any firms that would be interested in this type of work.

WILLIAM L. RUDIN
7815½ S. Drexel
Chicago 19

● The Western Cartridge Co., East Alton, Ill., and the American Manganese Bronze Co., 4797 Rhawn St., Philadelphia, have sheet rolling facilities and they roll aluminum bronze. Perhaps one of these sources can accommodate you.—Ed.

TOOL FORMULA CORRECTION

Sir:

Referring to the article "German vs. American Cemented Carbides," Feb. 7, it seems to me there is a misprint in the formula:

$$\text{Tool value} = \frac{10 \times \text{break strength in kg}}{5\,(93\text{-Ra})\,(47\text{-Ra}) + \frac{140}{2}}$$

According to the explanation given for this formula and according to the figures for "Equivalent on Standard Blanks, kg to break" given in the tables I to IV, the "Tool Value Computed" given in the same tables should result.

OTTO GUTTMANN
Forest Hills, L. I.

● You are correct, the formula should read:

$$\text{Tool Value} = \frac{10 \times \text{break strength in kg}}{5(93\text{-Ra})\,(47\text{-Ra}) + \frac{140}{2}}$$

PRECISION CAST ALLOYS

Sir:

We would greatly appreciate having a reprint of the article "Precision Cast Copper-Base Alloys," by Lipson, Markus and Rosenthal which was published in THE IRON AGE, Vol. 156, No. 18 and 19.

D. A. POTTER
Div. of Physical Metallurgy
Naval Research Laboratory, Anacostia Station, Washington

● We have some tear sheets, which we're glad to send you.—Ed.

SALT BATHS

Sir:

It would be appreciated if you would send me tear sheets of the article on salt baths by R. C. Stewart, which appears in the Feb. 14 issue, pp. 46 through 52.

HOWARD S. AVERY
Research Metallurgist
American Brake Shoe Co. Mahwah, N. J.

● Tear sheets of "Characteristics and Uses of Salt Baths" have been forwarded.—Ed.

FERROTUNGSTEN ORE

Sir:

I want to get in touch with a company who can give me information regarding ferrotungsten or a company from whom I can purchase a quantity of this ore.

E. L. GEIGER
Geiger Stereotype Co., Dayton

● Suggest you write the following: Electro Metallurgical Corp., New York; Molybdenum Co. of America, Pittsburgh; International Selling Corp., New York, Leonard J. Buck, Inc., New York.—Ed.

FLAME HARDENING

Sir:

In April 1941, you published in THE IRON AGE a series of articles on "Flame Hardening with City Gas" by J. M. Krappe. If possible for you to send us copies of these articles, we shall be extremely grateful.

S. C. GINNO
Manager
Oxy-Ferrolene Ltd., Oadby, Leicester, England

● Copies are being sent.—Ed.

GRINDING WHEEL FILM

Sir:

One of our clients who manufactures grinding wheels is interested in a motion picture showing the use of grinding wheels by industry in any of their various applications. We are trying to ascertain if any such film has been produced. Could you give us any information on the subject?

E. M. REYNOLDS
Fox & Mackenzie
Philadelphia

● The Carborundum Co., Niagara Falls, N. Y., has a good film such as you are interested in obtaining. Suggest you write to the company attention of Mr. F. D. Bowman, Director of Public Relations. The Norton Co., 50 New Bond St., Worcester, Mass., might also be able to help you.—Ed.

SIMONIZING MACHINE

Sir:

Will you please give me the name of a company who manufactures an electrical machine for use in simonizing automobiles.

F. RUGGLES
Vice-President
South American Procurement Corp., New York 6

● Black & Decker Mfg. Co., Towson, Md., manufactures this type of machine.—Ed.

SURFACE FINISHING

Sir:

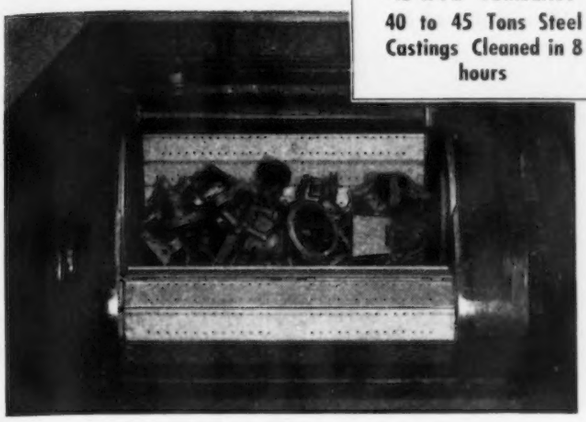
Please send us tear sheets of the article "Surface Finishing of Beryllium Copper" which appeared in the Nov. 15, 1945 issue.

FRED J. KAIM
Superior Plating & Rust Proofing Co., Minneapolis 14

● Tear sheets have been sent.—Ed.

PAY LESS for PAY LOADS

48″ x 72″ TUMBLAST
40 to 45 Tons Steel Castings Cleaned in 8 hours



Crucible Steel Castings Co., Milwaukee, Wis., uses two 48" x 72" Wheelabrator Tumblasts, each of which cleans 40 to 45 tons of castings daily. One machine cleans green castings, the other annealed castings.

9′ MULTI-TABLE
6 Airplane Engine Heads Cleaned in 3 min.

This No. 3 Wheelabrator Table is used in the plant of a prominent aircraft engine builder.

SWING TABLE
330 lb. Furnace Casting cleaned in 4 min.

4 hours were formerly required to tumble 3 of these castings at Premier Furnace Co., Dowagiac, Mich. (Note the small castings being cleaned with the large one.)

WHEELABRATOR AIRLESS BLAST CLEANING

Whenever you see the Wheelabrator at work you will marvel at the mountainous pay loads it turns out with perfect ease and dispatch. And if you will check into cleaning cost records you will find even more to excite your enthusiasm.

But let us suggest that you go a step further and ask for a demonstration of the Wheelabrator on your own work . . . the tangible proof of its value to you in better cleaning, time and cost saved, and other factors may amaze you even more.

Arrangements for such a test can be made at your convenience and without the slightest obligation. Write, wire, or phone us today.

SPECIAL CABINET
50% Cost Saving

These 120 lb. railroad castings are cleaned in a Wheelabrator Special Cabinet. Previous cleaning cost was 17.1¢ each. Present Wheelabrating cost is 8.4¢ each.

American FOUNDRY EQUIPMENT CO.
510 S. BYRKIT ST.
MISHAWAKA, IND.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

This Industrial Week . . .

- **Steel Consumers Scramble on Books**
- **Output to Pick Up Sharply Soon**
- **Export Allocations Weighed**

WITH major industrial strikes over or in the final stages of negotiations, steel consumers this week were in a mad scramble to be placed on mill order books for tonnages regardless of delivery promises. Order books are loaded already and backlogs are sufficient to represent several months production at high levels but this has had little effect in keeping customers from putting pressure on steel firms.

Some current factors point to a rapid acceleration in steel output after the coal controversy is out of the way. It is more than probable that the operating rate at that time will go beyond 90 pct of operations and might reach 95 pct for an extended period. Major reasons for this optimism is based on the outlook for equipment and manpower.

In recent weeks many steel companies have seen their manpower problem dissolve as the influx of returning veterans reached high proportions. Not only have most mills been able to obtain new employees in desired numbers, but they have also been able to stick close to a 40-hr week.

The result of this situation has been twofold. Returning veterans in many cases have represented experienced and skilled workers as contrasted to wartime when production was affected because of lack of experience. Furthermore, the ability of steel companies to go to a 40-hr week has brought the much needed shorter week for those employees forced to work long overtime hours during the wartime emergency.

THE combination of an easier manpower situation, a shorter week and one of the greatest wage increases in steel history is expected to bring about a sharp change for the better in productivity. Equipment is now in much better shape because of an intensive repair and rehabilitation program. The steel industry is now on the threshold of a period which will see not only high operating rates, but continuous ones, over long periods. If this movement is held back by the coal strike or slowed up it will nevertheless pick up momentum at a later date.

The coal strike outlook this week is still serious and there is nothing yet to indicate that the country will not face a mine shutdown. The calm and orderly beginning of the negotiations between coal operators and the United Mine Workers covers up a considerable number of explosive demands and counterdemands. However, within the past week some steel companies have been able to show slightly better supplies of coal and in a number of instances stockpiles will support the current operating rates for at least four weeks. There is still a large segment of the steel industry, however, which would be sharply affected if the coal strike should last three weeks. There also remains a necessity for slowing down operations in anticipation of a long shutdown at the mines.

Coming to the forefront soon will be the question of adequate scrap supplies to maintain a sufficiently high level of steel operations to complete the reconversion picture. Current operating rates gloss over the problem of an extremely restricted flow of scrap from outside manufacturing operations. In many steelmaking centers scrap shipments to mills are well below the rate of consumption. The only saving factor has been a large scrap inventory built up by shipments to holding points outside the mills during the steel strike.

SEVERAL steel companies through an agreement with the union also were able to carry on restricted blast furnace operations during the strike. This gave such companies an inventory of cold pig iron with which to piece out present requirements for steelmaking materials. As shipments of steel to consumers increase they in turn will produce more scrap, and it now appears probable that the pick-up will occur in sufficient time to prevent a serious crisis in the raw materials needed for steel production.

On the other hand a situation is building up which closely resembles some of the wartime periods when both scrap and pig iron were in tight supply and when order volume was reaching an all-time high. There is also a similarity between the present steel market picture and that which preceded the heavy production during the early months of 1937. As more and more industrial plants are completely reconverted, the drive for peacetime steel products will gain momentum. It was not unusual in former peacetime years to find many steel mills with orders booked as far ahead as a year on some products and an average of a half a year on many others.

Steel companies and their customers are closely watching the latest moves towards the possible allocations or directives on steel for foreign shipment. Last fall a plan was set up calling for enforced allocation of 840,000 tons of steel for export to various countries. This plan never got underway and was seriously affected by the steel strike. It is now understood that the Dept. of Commerce is trying to convince the Civilian Production Administration that a new export allocation program is necessary.

THE new program, which is by no means settled, involves close to 1,000,000 tons of steel products to be allocated for export over the next nine months. Resistance to this plan is based on the fact that steel firms already are shipping steel abroad using as a pattern the distribution in the prewar years.

The steel ingot rate this week again advanced having reached 89.5 pct of rated capacity up 4.5 points from last week. The raw steel output level is now on a par with prestrike volume and some small further gains are expected next week.

Due to the increase of 75¢ a ton on all grades of pig iron except charcoal, THE IRON AGE pig iron price composite has advanced from $25.37 a gross ton to $26.12 a gross ton.

• **STEEL PAYROLLS**—More than $1,645,000,000 in payrolls were distributed to iron and steel plant employees during 1945, double the sum paid out 10 yr earlier, the American Iron & Steel Institute reports. The steel industry's 1945 payrolls declined from the peak war year of 1944, when $1,745,000,000 were paid out. The 1945 total was almost identical with 1943 payrolls of $1,649,000,000 despite the fact that production in 1943 exceeded the 1945 total by more than nine million tons of ingots. Employment statistics for December, 1945, are as follows: Average number of employees 544,900; December payroll $122,527,700; average hourly earnings of wage earners $1.22; average hours per week per wage earner 39.0.

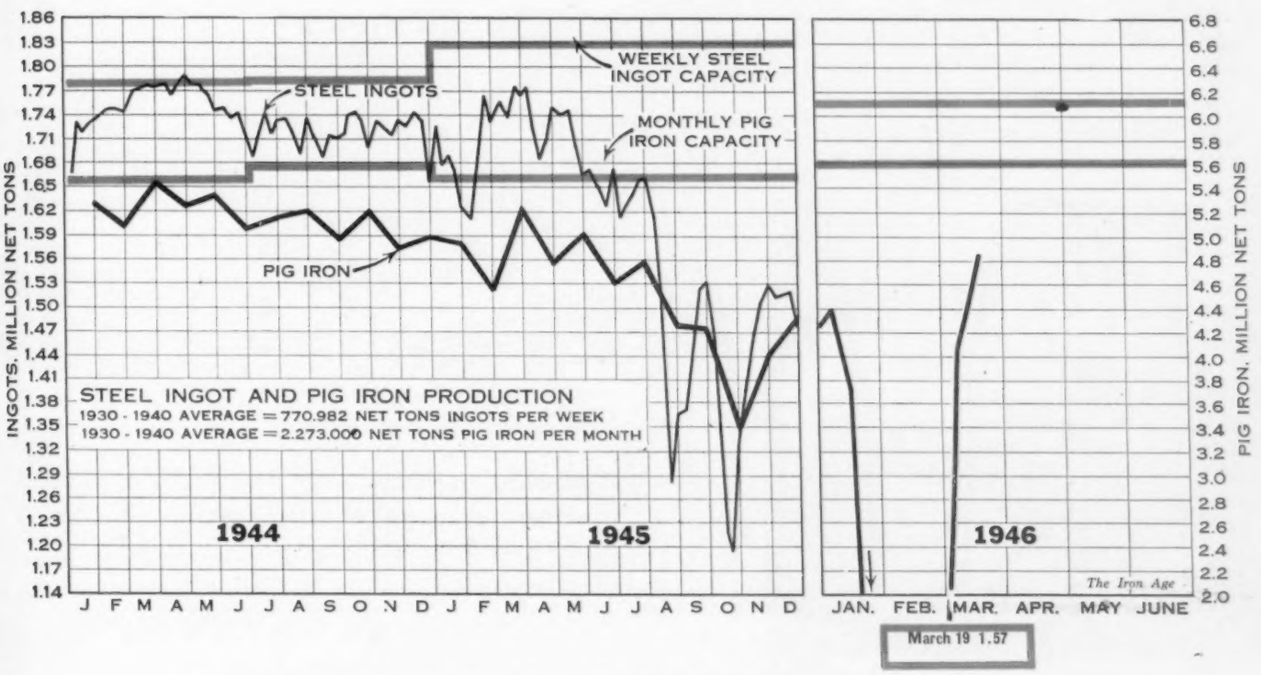
• **FENCE POSTS FOR SALE**—WAC has announced that 6,797,452 steel barbed wire fence and anchor posts, valued at $1,811,580, have been placed on sale in a nationwide disposal program. The posts were designed to special Army specifications with speed of installation and resistance to rough usage a principal consideration. It was stated that they are regarded as a great improvement over the old types of fence and anchor posts. WAC said that it expects to find a ready market for use on farms, orchards and ranches and by telephone, telegraph and power companies.

• **COAL RATE RISE STICKS**—Denying railroad petitions for rehearing, the Interstate Commerce Commission has reaffirmed reduced rates effective May 1 on bituminous coal from western Pennsylvania mines to the Youngstown district. The new all rail rates per ton are $1.32 from Indianola and Russellton and $1.37 from the Pittsburgh district. The ex-river rate from Conway and Colona, Pa., is 80¢. The only change the Commission made in the original report was the elimination of Hillsville, Sharon and Leesburg, Pa., from the list of destinations to which the ex-river rates apply.

• **COAL RATE RISE REACTION**—With the ICC denying the railroads a rehearing on the Youngstown coal rate case, it has come to a temporary close. The shippers had asked for a reduction of the rates over and above what was granted. This was also denied. The only recourse is through the courts and this method is not expected to be taken at this time. Shippers in the Youngstown-Warren areas point out that ex-river coal rates to those points continue to be the most lucrative rail hauls in the country. They claim rates in other areas on coal and iron ore both all-rail and ex-river range from a low of 28¢ a ton based on the Conway-Colona to Youngstown mileage to a high of 67¢ a ton. The rate paid by Youngstown shippers prior to the adjustment last fall was 90¢ a ton which was reduced to 80¢ a ton by the ICC ruling.

• **FRENCH DOMESTIC ORDERS**—The S. N. C. F. (French State's Railways Co.) has established their first postwar plan for the ordering of locomotives and freight cars which will call for the consumption of 234,000 metric tons of steel. The first allocation from French steel production amounting to 35,000 tons has been awarded for the first quarter of 1946.

• **WHAT PRICE PREFAB?**—A study of prefabricated structures built for the government during the war will be released shortly by the Bureau of Labor Statistics, U. S. Dept. of Labor, with preliminary indications it will show the number of manhours required is approximately the same as for structures built by conventional methods. This does not necessarily mean that prefabrication is not cheaper, for other items, such as standardization, enter into cost. As another boost for the housing program, the Dept. of Commerce is about to study state and local building codes with view to working out a suggested uniform code for the entire country. Climate and other local variations will be taken into consideration. In the same parcel is a study of restrictive association practices.

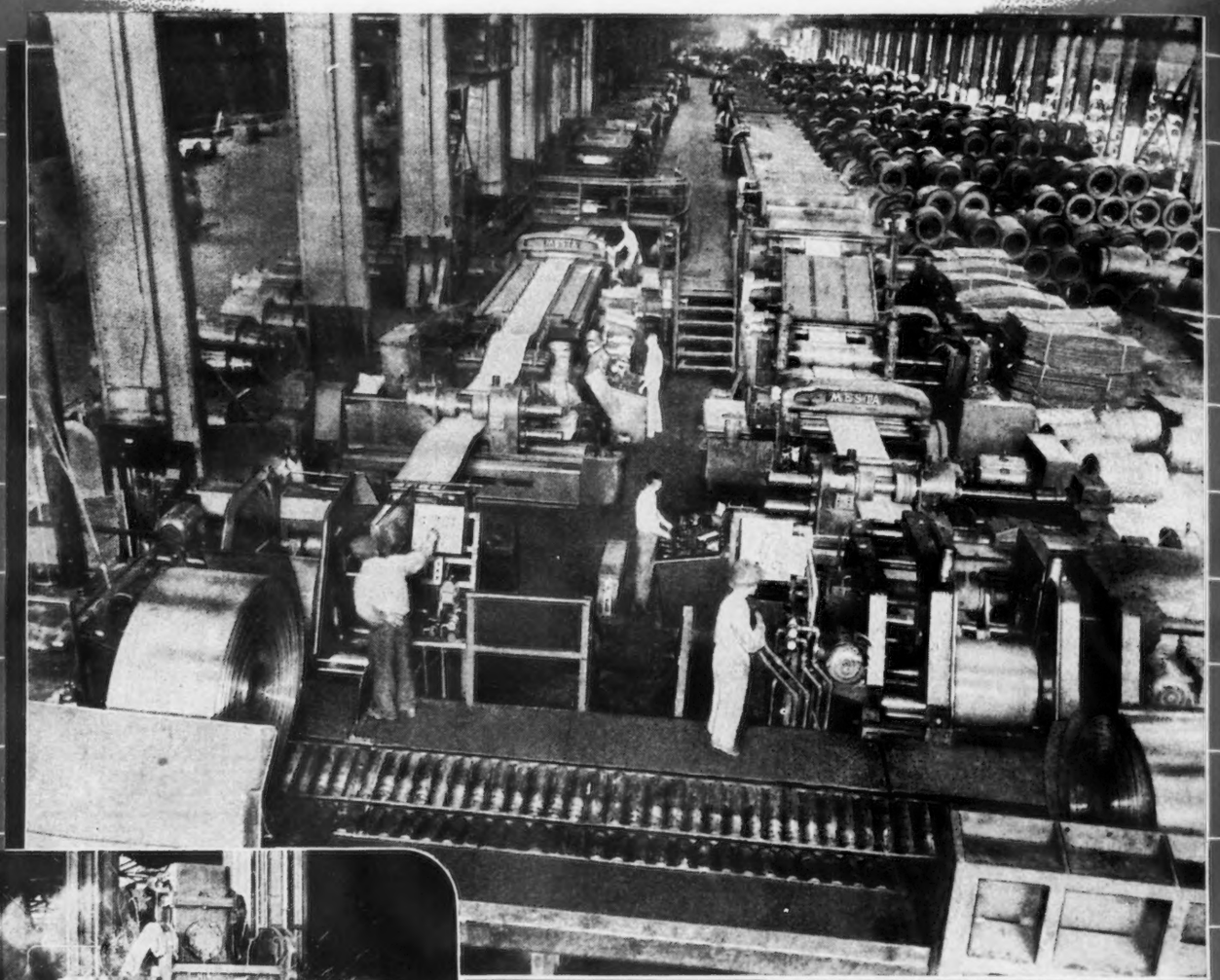


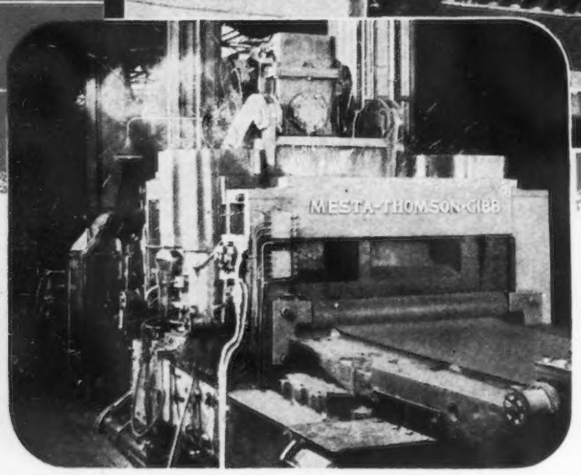
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 12.....	99.0*	86.0	78.5*	78.0	95.0*	71.0	94.0	95.0	93.5	58.0	90.0	94.5	95.5	85.0
March 19.....	99.5	88.5	82.5	91.5	96.0	87.5	94.0	95.0	100.0	59.0	90.0	71.5	112.5	89.5

*Revised

Continuous pickling lines *built by* MESTA





The Mesta-Thomson-Gibb Flash Welder, located at the entry end of continuous pickling lines, produces heavier coils with butt welded joints suitable for cold rolling on high speed mills.

A Mesta Continuous Pickling Line delivers greater tonnage of strip steel. This is due not only to the design and sturdiness of the individual units, but also to correct engineering of the entire process.

★ BUY VICTORY BONDS ★

The Army-Navy "E" Flag with five stars flies over the Mesta Plant

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

Slim Supplies of Farm Implements Seen Because of Strike

Chicago

By CHARLES T. POST

o o o

• • • **Slimmer supplies of** farm equipment are in prospect for this year's crops than at any time during the war, with the principal manufacturers ending the fifth month of the production year far behind schedule.

Strikes at major farm equipment plants and at supplier's plants have combined to keep production for the industry as a whole to a trickle. In the face of early estimates that 30 pct more new equipment would be required this season than last, output thus far trails that of the 1944-45 production year. Most of the implements are required on a seasonal basis so that even a sudden spurt to make up lost time would help this year's crop production little.

Psychologically, settlement of strikes in other major industries has improved the prospect for settlement of present and pending strikes in farm equipment plants, but there is a considerable segment of no man's land between farm equipment management and the union which must be traversed before production is resumed.

Even a quick settlement of the International Harvester Co.'s strike now entering its third month, would not assure prompt capacity production by the company which estimates that several weeks would be required to reach top speed. So far as is known by the company, equipment is in good condition, but restoring the flow of materials and components into the production line is expected to build up slowly. Even prior to the strike, International was behind schedule because of manpower shortage, spasmodic work stoppages, and interruption of parts deliveries from suppliers.

The company's stipulation that it be assured of a price increase if it meets the 18¢ per hr wage rise recommended by the fact-finding panel has led to an exploration of the price situation by the Office of Price Administration without encouraging signs thus far. Settlement of other union demands including closed shop, annual wage, liberalized vacations, and abolition of the incentive system, still must be ironed out before an agreement is reached covering the ten affected plants.

More encouraging from a production standpoint is the back-to-work movement involving practically the entire personnel of two J. I. Case Co. plants. Although the United Auto Workers (CIO) has not called off its strike which started Dec. 26, a back-to-work movement of workers to the Rock Island, Ill., plant enabled partial production in January, and a full complement was on hand Mar. 4, according to the

company. This plant produces the company's small tractor and companion implements. Production at the Burlington, Iowa, plant which make the small Case combine. also was resumed Mar. 4 with a full labor force. There has been no break in the strike at the Racine, Wis., and Rockford, Ill., plants, however. Case, like the other manufacturers, still is experiencing interruptions in the receipt of components and supplies, but is encouraged by the output of the plants in production.

Production efficiency at the tractor and farm machinery plants of Allis-Chalmers Mfg. Co. is not assisted by the unions involved dangling a strike threat on a very thin thread. The strike threat is said to have hampered recruitment of labor to overcome a chronic manpower shortage.

As many as 100 of the company's suppliers have been on strike at one time, with interrupted flow of materials and keeping farm equipment production at a slow and jerky pace. Production was materially reduced during the steel strike, and steel deliveries are not yet reported back to normal.

The General Motors strike directly hit output of Allis-Chalmers track-type diesel tractors which are powered by General Motors units.

Deere & Co. plants, whose strikes were settled last November, are as close to full production as a short manpower supply allows, but have not been able to make up for output lost during the strike. Deere has experienced production headaches through interruption of deliveries of parts from suppliers and through steel shortages, but schedules are being met, according to the company. Deere expects to have its new Dubuque, Iowa, plant ready for production by the end of the year on a new general purpose tractor for small farms. The new tractor is in no sense a baby tractor, being considerably larger than the company's present smallest model.

From the standpoint of strikes in its own plants, the Massey-Harris Co. has led a charmed life. Its production to date in the current manufacturing year is understood to be ahead of the comparable period in the 1944-45 production year, even though somewhat behind the 1945-46 timetable. . So far, it has skimmed through the steel strike and strikes of suppliers without serious effects upon production. Like the other manufacturers, however, the question of whether deliveries will be resumed from steel mills and other plants which have been struck soon enough to forestall a supply crisis, presents a future inhibited by question marks.

Oliver Corp., whose South Bend, Ind., plow and repair parts plant had been on strike for 20 weeks, and whose Charles City, Iowa, tractor and plow unit had been struck since Feb. 5, is running on a greatly curtailed basis at three other plants because of shortages of components and steel. Strikes at both plants were settled Mar. 15. The company was particularly hard hit by the steel strike and suffered a severe loss of production. Currently, lack of steel, bearings—which seem to be a bugaboo for all the farm equipment makers—electrical equipment, and Link Chain are holding the production pace slow except at the Battle Creek, Mich., plant.

Alva W. Phelps, president, estimated to stockholders recently that strikes have cut output of farm equipment replacement parts as much as 60 pct. He reported productive efficiency of labor at a low ebb. Despite present problems, Oliver is completing an expansion of its Cleveland crawler tractor plant and is building a branch warehouse in Kansas City.

Production officials of several plants regard the possibility of meeting schedules for the year on the whole, should labor troubles suddenly clear up, as virtually foreclosed by cuts in steel quotas recently put into effect by the mills.

HAPPY DAYS: *While the farm implement strike continues to present a serious aspect for future food problems, General Electric workers have gone back to work with a pay raise. The nation is far behind on home appliance production.*

United Engineering Nets Profit of $2 Million

Pittsburgh

• • • **United Engineering &** Foundry Co. reports for the year 1945 net profit of $2,341,861, compared with net profit of $2,350,351 in 1944.

The 1945 net profit includes a $126,000 carry-back of 1945 unused excess profits credit. A provision of $30,000 for contingencies was made, compared with $200,000 in 1944.

Claims covering terminated contracts are being processed promptly, approximately 75 pct of their total claims having already been paid, the company reports.

It was said a tentative agreement has been reached with the RFC for a new lease to operate the New Castle, Pa., plant for three years with an option of two additional years. It is the company's intention to produce postwar products there.

OPA Clarifies Steel Price Rise Order for Borderline Products

Washington

• • • **OPA in a letter** to steel producers on March 19 announced an official description of 12 products which were included in the list giving price increases under Amendment 15 to RPS 6.

This description was given because OPA said product descriptions originally were "of necessity" stated in broad terms. Since then a number of questions have arisen concerning the classification of particular items.

It was deemed advisable, the pricing agency declared, in order to remove the possibility of error to issue the official interpretation contained in the letter.

The following rulings were made in the letter:

(1) Tight cooperage and slack barrel hoops are a variety of hot-rolled strip and customarily have been priced on the same basis as the latter commodity. Accordingly, their base prices may be increased by the applicable amount set forth in Amendment 15 for hot-rolled strip. Tobacco hogshead hoops, on the other hand, have been customarily sold on a per set basis and therefore received an increase of 8.2 pct.

(2) Culvert sheets receive the same increase as galvanized sheets.

(3) In July 1945 OPA issued an official interpretation to the effect that wire tacks are a type of wire nails. They retain that classification for the purposes of Amendment 15 and received an increase of 35¢ per 100 lb.

(4) The increase in the maximum price for roofing and siding is to be determined by reference to the flat-rolled product from which it is made. Thus, the base price for galvanized roofing and siding was increased 35¢ per 100 lb while roofing and siding made from hot-rolled sheets was increased 22.5¢ per 100 lb.

(5) Commodity cold-rolled strip is a variety of cold-rolled strip and takes the same increase.

(6) Nitralloy is an alloy steel and received an increase of 4 pct on base price and extras.

(7) The applicable increases granted for low alloy, high tensile steels are to be determined by reference to the seller's customary pricing practice. If a producer customarily priced a particular low alloy, high tensile steel product by the use of alloy steel extras, such product shall be considered an alloy steel for the purpose of determining the amount of increase granted by Amendment 15. If, on the other hand, the producer customarily priced the product by the use of carbon steel extras, the increase shall be the same as that granted for the same type of product made from carbon steel.

(8) The dividing line between cold-rolled strip and cold-rolled spring steel is different for various producers. In determining the applicable increase granted by the amendment, each producer must follow his customary practice. Thus, material which the producer customarily sold as cold-rolled strip received an increase of 25¢ per 100 lb while material customarily classified as cold-rolled spring steel falls within Section 1306.17 (B) (7) of Amendment 15 with an increase of 8.2 pct on base price and extras.

(9) Splice bars received an increase of 15¢ per 100 lb even though they are sold in pairs.

(10) Mine ties are covered by Section 1306.17 (B) (7) of Amendment 15 with an increase of 8.2 pct on base price and extras.

(11) The increase granted by Amendment 15 for die-rolled sections covered by Revised Price Schedule No. 6 is to be determined by the producer's customary practice. If he customarily priced them on a hot-rolled bar base they take the same increase as such bars (25¢ per 100 lb); if he customarily priced them as a semi-finished product base, they take the increase applicable to such product.

(12) Red hard sheets are a variety of hot-rolled sheet and take the same increase (22.5¢ per 100 lb).

(13) The increases granted by Amendment 15 for pipe and oil country tubular goods may be computed by making the appropriate reductions in the applicable off discounts. Thus the increase of $6 per ton for buttweld and lapweld may be accomplished by reducing the applicable discounts by 3 points while the $5 increase for electric weld and seamless may be figured by reducing discounts by 2.5 points.

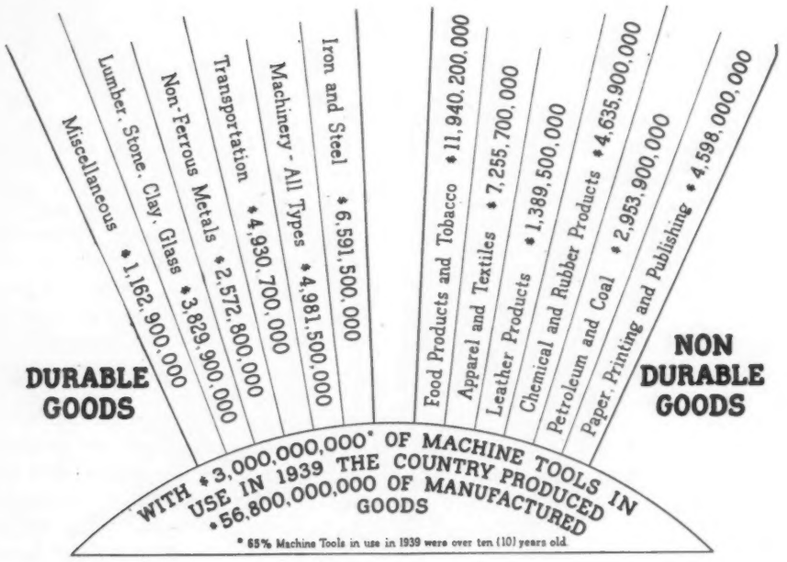
Additional interpretations will be issued should the need arise, OPA said.

Surplus Property Directors Named

Washington

• • • Effective Mar. 25 with establishment of the War Assets Administration, successor to the War Assets Corp., 33 directors have been designated to handle WAA surplus property activities throughout the country through a new field system. Each of the newly designated directors has been actively engaged within RFC regional agency offices, in supervising disposals in his respective region for WAC, an RFC subsidiary.

The list of regional directors follows: H. L. Kennon, Atlanta; McClellan Ratchford, Birmingham; John Millea, Boston; J. K. Wilson, Charlotte, N. C.; F. A. McLaughlan, Chicago; Roland D. Schell, Cincinnati; Floyd E. Brickel, Cleveland; A. G. Elmendorf, Dallas, Tex.; John A. Skeen, Denver; Henry F. Eckfeld, Detroit; Hamilton Morton, Ft. Worth, Tex.; Vernon M. Pomeroy, Helena, Mont.; Albert E. Regester, Houston, Tex.; William J. Warren, Jacksonville, Fla.; John E. Kirchner, Kansas City; Serge F. Ballif, Los Angeles; Charles C. Christian, Little Rock, Ark.; R. M. Bottomley, Louisville, Ky.; Arthur W. Carlson, Minneapolis; H. W. McMenaway, Nashville, Tenn.; Leonard E. Barnes, New Orleans; Frank I. Seymour, New York; R. D. Wilbor, Jr., Oklahoma City, Okla.; Gordon T. Burke, Omaha; George L. Evans, Philadelphia; L. T. Mudge, Portland, Ore.; A. H. Graham, Richmond, Va.; Charles G. Alexander, St. Louis; W. J. Walthall, San Antonio, Tex.; Joseph S. Willes, Salt Lake City, Utah; Leland C. Dedo, San Francisco; O. C. Bradeen, Seattle, Wash.; and James G. Wilcox, Spokane, Wash.



Cleveland

• • • **With rising unit** costs and lowered production breaking through price ceilings everywhere in the machine tool industry, its immediate operations would seem to depend largely on the academic question of whether or not the prices of its products make any difference in the ultimate cost of living.

Romanticized during the war to a degree proportionate to its importance but disproportionate to its size, the industry would seem to appear to an OPA-alerted Washington as a prosperous industrial giant whose private hoard of lucre will permit it to idle in a state of productive dormancy oblivous to the government controls of the postwar period's mundane profit sphere.

Far from being a giant, the machine tool industry is a prince and a pauper industry of small companies (few have 1000 wage earners). In 1942, its boom year, the industry had 122,000 wage earners, and its production was valued at $1,320,000,000, which includes widespread subcontracting, since further plant expansion was physically impossible. By comparison, the steel industry in 1942 had 567,000 wage earners, and the total value of its sales was $6,266,000,000. But in 1939, the machine tool industry had 36,600 wage earners, roughly equivalent in size to the New York police force at the start of the war.

The recent and financially harried history of the industry provided an ideal framework for the structure of price inequities. In 1936, the machine tool industry had just emerged from its longest depression. From 1930 through 1935 the value of output had averaged a bare $55,000,000 a year, a sum equal to half of its average demand and about 29 pct of the previous peak shipments of $185,000,000 in 1929. But more than half of the orders placed in 1936 were destined for a Europe that was preparing for war.

In 1939, this country's preparations for the approaching conflict required machine tools in quantity, and the industry's production doubled from $200,000,000 in 1939 to $440,000,000 in 1940, and again to $775,000,000 in 1941.

On Jan. 20, 1942, price ceilings, with the avowed purpose of protecting the consumer of a given article, and the government, from excessively high prices in the purchasing of war material, were placed on machine tools, based on Oct. 1, 1941 prices.

The government had ample means for protecting itself through excess profits taxes and later through renegotiation of contracts. Price ceilings on machine tools opened up the industry to the stringencies of all three. At the same time, the balance that normally exists between prices of competing producers in a free

Strategic Machine

market had been upset by three full yr of war production.

Now, in a period of problematical transition, great confusion exists, because prices conform to no known pattern. One builder finds himself competing with newcomers in the field whose prices are higher than his. For both to exist and operate with some profit during the important phase of government surplus machine tool disposal, the wartime price differentials must be discarded in favor of competitive pricing.

OPA's alleged tender treatment of newcomers and the resultant inequities, finally brought one long-established machine tool company to applying for price relief. The company received its first procedural information in June 1944. A 10 pct increase was ordered in March 1945, on shipments after Jan. 31, 1945. In this case it took nine months to get a decision, and relief was denied for the first six months following application. Such a policy will ultimately lead to dependence on a few builders of each type of machine.

The U. S. Bureau of Census report for 1939 shows a total production of manufactured goods valued at $58,000,000,000. This volume of output is illustrated by the rays on chart 1, representing the major durable and nondurable goods industries. Products produced by these industries depended upon the machine tools in use, and the total machine tool pool in 1939 was valued at about $3,000,000,000. That pool of machines was maintained out of an average yearly output of new machine tools of about $100,000,000 over the previous 20 yr, and during that time at least 15 pct of the machine tools produced were exported.

Based on 1939 experience, one of the best peacetime years, the ratio of new machine tools per yr to the total of manufactured goods is as 100,000,000:58,000,000,000; or as 1 to 580, or about 17/100 of 1 pct of the total value of manufactured product.

Tool Industry Erroneously Seen as Giant

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By WILLIAM A. LLOYD

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Additional support for the statement that machine tool prices have little or nothing to do with the cost of the ultimate product can be had from results of a test made on operating costs in a machine tool plant. (Chart 2).

The operating cost of the machine tool equipment in the plant is shown as the small wheel that drives the large one. Operating cost includes depreciation charges, all maintenance costs, taxes and insurance charged to the equipment.

All other shop costs, represented by the large wheel, include the cost of materials, labor, and all indirect expenses chargeable to the cost of the product. In this case, the machine tool operating costs amount to only 3.4 pct of the total shop costs; all other costs make up 96.6 pct of the total.

In plants producing consumer goods, where mass production methods are possible, the cost of operating the machine tool equipment should be even less in relation to the factory expense. If the small wheel were to represent their machine tool operating costs per unit of product produced, the machine tool wheel that keeps the shop wheel turning would be hardly visible on a chart of this size.

Many problems, all of them more or less related to price structures, confront the industry. Excess capacity is one. With shipments at the rate of $30,000,000 a month compared with a capacity based on a possible $100,000,000 a month, the 1942 peak, much machine tool capacity is idling.

At the same time, labor and material costs have increased, and postwar operations call for research and services to customers, if only to assist in the selection of a good machine from the government surplus pool. There is the omnipresence of the government-owned surplus. Many companies producing standard general purpose equipment are feeling its effect. This alone would serve as a brake on price increases.

To date, the impact of the surplus tools on the market has been cushioned by poor handling, partially the result of red tape and inexperienced personnel, extraordinary delay in making an inventory and by the very size of the task. It is hardly necessary to recall that this equipment was good enough to make aircraft engines and breach assemblies for heavy artillery; and the builders, by redesign, are not going to make it obsolescent right away. The margin of improvement is less after this war than after the last.

These and other factors set the stage for the entrance of machine tool companies into new lines: Textile machinery, milk bottle machines, farm and road building equipment are but a few of the many new products the industry will make as it turns toward utilization of excess plant capacity.

From the general shape of things, and in view of the fact that the consumer in the case of machine tools is the manufacturer, who buys machine tools only when they will lower his unit costs, it would seem that OPA must regard the industry as either too small to worry about, or too big a bee in the hive of the public mind to help. That price ceilings could come off machine tools now, without causing even a faint economic ripple, is apparently incidental.

There are other possibilities that OPA opinion on the removal of machine tool price ceilings has reached a dogmatic state and that such removal has been exiled to the never-never land merely on principle; or that publicity-wise, removal would open the OPA door to the onslaught of many other industries; or that the eager beavers are all too anxious to point a denouncing finger at even a verbal bulge.

Long recognized as a feast or famine industry, the machine tool builders face a period of intense competition, in itself a most efficient deterrent to price raising, and the unbalances created when the price ceilings were set have not been corrected and under the strong competition that exists, are not likely to be.

The industry needs to restore some semblance of that balance. Some builders are losing money on some of the machines they're making. Their alternative is to stop making them, and spend the money they have on development of products outside the machine tool field with better buoyancy in rough economic weather. Such dispersion of effort, while not altogether desirable in the opinion of some observers, might conceivably develop into a profit lifeline.

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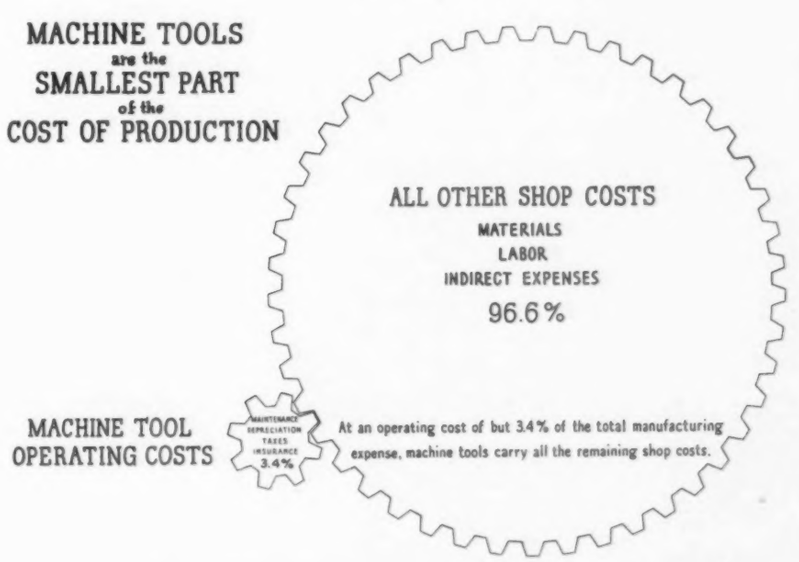

OPA Grants Price Rise Of 75¢ a Ton for All But Charcoal Pig Iron

Washington

• • • **Made effective immediately,** OPA on Mar. 15 announced an increase of 75¢ per gross ton in the ceiling prices for all grades of pig iron, except charcoal. No change was made in the price of the latter grade.

OPA said that the price increase will compensate producers for advances in production costs, including wage increases approved recently by the National Wage Stabilization Board.

It was pointed out that the price adjustment will enable the merchant pig iron industry to earn an average rate of profit during the next 12 months equal to its average rate of return on net worth in the years 1936-39.

Since 1941 when price control began, there have been two other increases in pig iron ceiling prices. The first price increase was $1 per gross ton granted Feb. 14, 1945. The second was 75¢ per gross ton which became effective Oct. 23, 1945.

"In determining the amount of adjustment in maximum prices for pig iron needed to satisfy the standard prescribed in Executive Order 9697, OPA used as a starting point adjusted data reflecting the fourth quarter of 1945 experience of the eight representative companies included in the study," the price agency said.

"These figures were then corrected to give full effect to the increase in maximum prices made in October, 1945, and known cost increases which were included, or only partially included, in the fourth quarter.

"Next appropriate adjustments, both upward and downward, were made on account of changes in costs and volume which may reasonably be expected to occur in the next 12 months, and a final result was converted to an annual basis."

Coming Events

Mar. 25-26—American Machine Tool Distributors' Assn., Chicago.

Mar. 29-30 American Gas Assn., conference on industrial and commercial gas, Toledo.

Apr. 2-5 American Management Assn., packaging exposition, Atlantic City, N. J.

Apr. 3-5 Society of Automotive Engineers, national aeronautical meeting, New York.

Apr. 8-12 American Society of Tool Engineers, annual convention and exposition, Cleveland.

Apr. 10-13 Electrochemical Society Inc., spring congress, Birmingham.

Apr. 22-27 National Plastics Exposition, New York.

Apr. 25-26 American Institute of Mining and Metallurgical Engineers, openhearth, blast furnace and raw material conference, Chicago.

Apr. 29-30 National Welding Supply Assn., bi-annual convention, Dayton.

May 6-7 Assn. Iron & Steel Engineers, spring conference, Chicago.

May 6-10 American Foundrymen's Assn., golden jubilee convention and exposition, Cleveland.

May 29-31 Machinery Dealers National Assn., Atlantic City, N. J.

June 2-7 Society of Automotive Engineers, summer meeting, French Lick, Ind.

June 3-5 American Gear Manufacturers Assn., annual meeting, The Homestead, Hot Springs, Va.

June 13 Metal Powder Assn., spring meeting, New York.

June 17-18 American By-Product Coke Institute, first annual meeting, Seaview Country Club, Absecon, N. J.

June 24-28 American Society for Testing Materials, annual meeting, Buffalo.

Steel Industry Plans Improvement Program

New York

• • • **Steel companies are planning** to spend this year the record-breaking total of $327,000,000 for new equipment and additional facilities needed to fill post-war steel demands, the American Iron & Steel Institute announced Mar. 18.

The industry's anticipated expenditure for new equipment in 1946 raises to $2.5 billion the total amount of money spent since 1935 by steel companies to expand and improve their plants. Half of that total was spent between 1940 and 1945 as the industry's wartime expansion program. The other half was spent in peacetime years.

Anticipated new equipment expenditures for 1946 exceed by 10 pct the peak reached in any year of the war and are more than double the amount actually spent in 1945.

Most of the expenditures scheduled for 1946 will be for new and improved rolling mills and finishing facilities. Because of the huge wartime expansion in blast furnace and steelmaking facilities, relatively little new construction is anticipated in those departments during the current year. Instead, the bulk of the expenditures will go to buy new machinery and equipment for producing highly finished types of steel.

Prewar Output Surpassed

Washington

• • • **National production rates,** including agricultural as well as industrial, have outstripped anything achieved in the prewar era, according to the *Federal Reserve Bulletin*. Overall postwar production is now substantially above the average for the years 1935-39.

This conclusion of the periodical was based on the following factors:

"Employment in all major lines of activity except agriculture, mining and construction is above the advanced 1941 level. Unemployment around 2,700,000 in February, considerably less than the 1941 average of 5,000,000 and the 1939 average of 9,000,000.

"Output of most goods and services is close to the capacity of the country's resources under present conditions."

Weekly Gallup Polls . . .

Public Wants Bomb Test Results Kept Secret

• • • **The American public** is opposed to inviting observers from foreign countries to watch the Navy's atomic bomb tests in the Pacific this summer, according to George Gallup, director, American Institute of Public Opinion.

Moreover, a large majority oppose giving any report to other nations on the results of the tests, once they have been made.

People with college training included in the surveys are not so overwhelmingly opposed to either proposal as are persons with high school training or less.

The opinion of World War II veterans on these questions does not differ significantly from that of the rest of the population.

The question of permitting observers from foreign countries to watch the tests and the issue of making available data on results have been reported under discussion among the Joint Chiefs of Staff, the Secretaries of State, War and Navy.

The questions in the poll:

(1) "This summer our Navy plans to make tests at sea to find out how effective the atom bombs would be in naval warfare. Do you think that representatives of other nations should or should not be allowed to watch these tests?"

Replies:

	Should Pct	Should not Pct	Undecided Pct
NATIONAL	26	66	8
BY EDUCATION			
College	45	49	6
High school	31	63	6
Grammar or no school	19	72	9

(2) "Do you approve or disapprove of giving other nations a complete report of the results of the tests?"

	Approve Pct	Disapprove Pct	Undecided Pct
NATIONAL	28	63	9
BY EDUCATION			
College	44	50	6
High school	33	59	8
Grammar or no school	21	68	11

Public sentiment on the present questions is consistent with earlier findings showing the public's conviction that the United States should not share the atom bomb secret with other nations.

A majority, in a survey in October, favored keeping the atom bomb under U. S. control rather than under the United Nations Security Council.

This opinion is held in spite of the belief among a majority in this country that the secret of the atom bomb cannot be kept, that other nations eventually will develop atom bombs.

•

• • • **An overwhelming** majority of Americans are favorably disposed toward a program to cut down food consumption here in order to send more food to Europe.

More than two thirds of the nation's families, in the latest survey of opinion on the subject, say they are willing to use less flour and eat less meat, and to put up with present shortages of butter and sugar, in order to help feed people in need abroad.

Every survey made on the issue for the past three years has found substantial majorities willing to send food to Europe, indicating a widespread belief on the part of the public that the need for aid abroad is acute.

It remains for the government to lay down a specific program. If one is formulated, telling housewives precisely what they are expected to do, the cooperation of a majority of families can be reasonably expected. There would be objections from a minority of course, the extent of the objections depending on how much sacrifice people are asked to make. But the majority are at least favorably disposed toward the idea of sending food to aid Europe.

The current attitudes were sounded by interviewers for the institute who questioned men and women from coast to coast.

The vote:

"Would you eat less meat and use less flour in order to send more food to the people of Europe?"

	Pct
Yes	67
No	22
No opinion	11

Women showed a higher vote of approval than men. The vote of women was 72 pct, that of men 61 pct.

Will Give Up Food for Europe But Not Atom Bomb Knowledge; City Food Costs Jump 50 Pct

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Public approval of sending food abroad dates back at least as far as 1943. In December of that year, the institute found 67 pct of the population saying that they would put up with shortages for a year or two after the war in order to give food to people in Europe. In April of 1945, the vote was 65 pct in favor.

In June, 1945, a substantial majority of voters said they would be willing to eat about one-fifth less in order to ship foodstuffs abroad. The vote was:

"If necessary, would you and your family be willing to eat about one-fifth less than you are now eating in order to send more food to Europe?"

JUNE, 1945

	Pct
Yes	70
No	23
No opinion	7

According to reports by the United States Dept. of Agriculture, the urban population in half of Europe is existing on less than 2000 calories a day and in some countries on less than 1500 calories a day, as compared to an estimated 3360 calories available per capita in the United States in 1946.

•

• • • **The typical American** family not living on a farm spends nearly 50 pct more money for food each week than it did only four years ago.

Weekly food budget in the typical home in 1942 was $11.50. Today the typical family spends $17.00 weekly.

The increase reflects two factors—the rise in living cost and the fact that people have much more money to spend now than they did before the war.

Present family food budgets

(CONCLUDED ON PAGE 146)

French-Italian Trade Pact Promises Increased Scrap Movement

Paris

• • • **Inclusion of scrap** exports to Italy from France under the terms of a recently negotiated trade agreement give rise to discussion of the possibility of greatly increased movements over prewar standards. Traditional sources such as Switzerland and the United States seem unlikely to be in a position to ship appreciable amounts in the near future, while sales have recently been freed in France, indicating an ample supply.

Scrap consumption in the Italian iron and steel industry before the war was comparatively high. For example its blast furnaces in 1935 consumed 436,000 metric tons of scrap, pyrite cinder and slag to produce 700,000 tons of pig iron and 2,200,000 metric tons of steel. In the same year 1,700,000 metric tons of scrap were consumed at the steel mills.

These figures compare with iron ore consumption that did not exceed 750,000 tons (550,000 from Italian mines on the Isle of Elba and the Piedmont, and 200,000 metric tons of imported ore). This scrap consumption proportion was even higher for Italy than the rate in Japan.

The autarchy plan, which was to have made the country less dependent on supplies from abroad, provided for increased exploitation of the country's iron ores and the construction of new blast furnaces, especially at the Corniglia-no steelworks established in 1939, where the phosphorous ores from Sardinia were to be used. But in spite of this effort, the Italian iron and steel industry, owing to its small iron ore resources and the lack of coal (12 million tons of coal per year had to be imported, mainly from Great Britain), could never do without imports from abroad to get the necessary raw materials such as coal, coke, iron ore and scrap.

In wartime it was necessary to import Ruhr and Upper Silesian coal, and semifinished products, from Germany. Pig iron production was on a reduced scale, and electric power from the Alpine districts was used in northern Italy. It should be noted that even before the war the Italian iron and steel industry, out of a total of 2,200,000 metric tons of steel, produced nearly 600,000 tons in the electric furnace, which amounts to approximately 35 pct, a figure much higher than for countries producing on a large scale.

As it happened, most of the installations in northern Italy were not too seriously affected when the country was liberated, and could resume production rather quickly where raw materials were available in sufficient quantities. Power works had also suffered little damage, so that electric energy was also available.

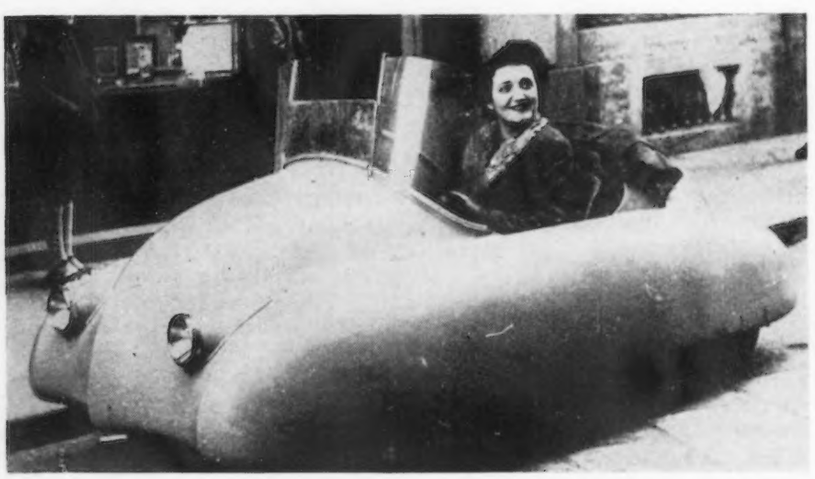
In 1936 Italy imported 365,000 metric tons of iron and steel scrap and 35,000 tons of pig iron scrap, a total of 400,000 tons. 280,000 tons of the total was supplied by the United States, 68,000 tons by France, and 24,000 tons by Switzerland.

Switzerland's stocks of scrap are low, and as in wartime, all the scrap available is still being kept for its electric furnaces.

Before the war, France exported approximately 500,000 tons of scrap per year (535,000 tons in 1936). Large quantities are at present available for disposal, and the market is now open again, indicating that sufficient quantities are expected to be available to warrant the resumption of free trade in this commodity. It is now a question of whether France will be able to export on a prewar scale again. In 1936, France exported 240,000 tons to Great Britain, 68,000 tons to Belgium and Luxemburg, and 68,000 tons to Italy. Statistics relating to exports during the last few months to Great Britain, Belgium and Luxemburg have not yet been published, but shipments have probably been on a small scale.

Under the trade agreement recently announced, goods to be exchanged between the two countries will include silk, pyrites and fruit from Italy, while France is to send phosphates, paper, and, among other things, scrap.

ITALY'S ANSWER TO GAS SHORTAGE: *A new midget car has been produced at a Turin factory, having a 125-cc engine which will drive the car for 62 miles at 32 mph on about three quarts of gasoline.*



Belgian Iron Output Off

London

• • • **A slight falling** off in production of pig iron is reported in Belgium by the Iron & Coal Trades Review. The drop is attributed to a shortage of coke. Rerollers are said to be showing satisfactory activity, but are also limited by the quotas on both coal and coke.

Numerous orders are said to have been confirmed by Belgian producers under the terms of the new trade agreement with Portugal. Such orders with additional ones from Sweden and Switzerland will probably consume all the iron and steel products that Belgium is in a position to export

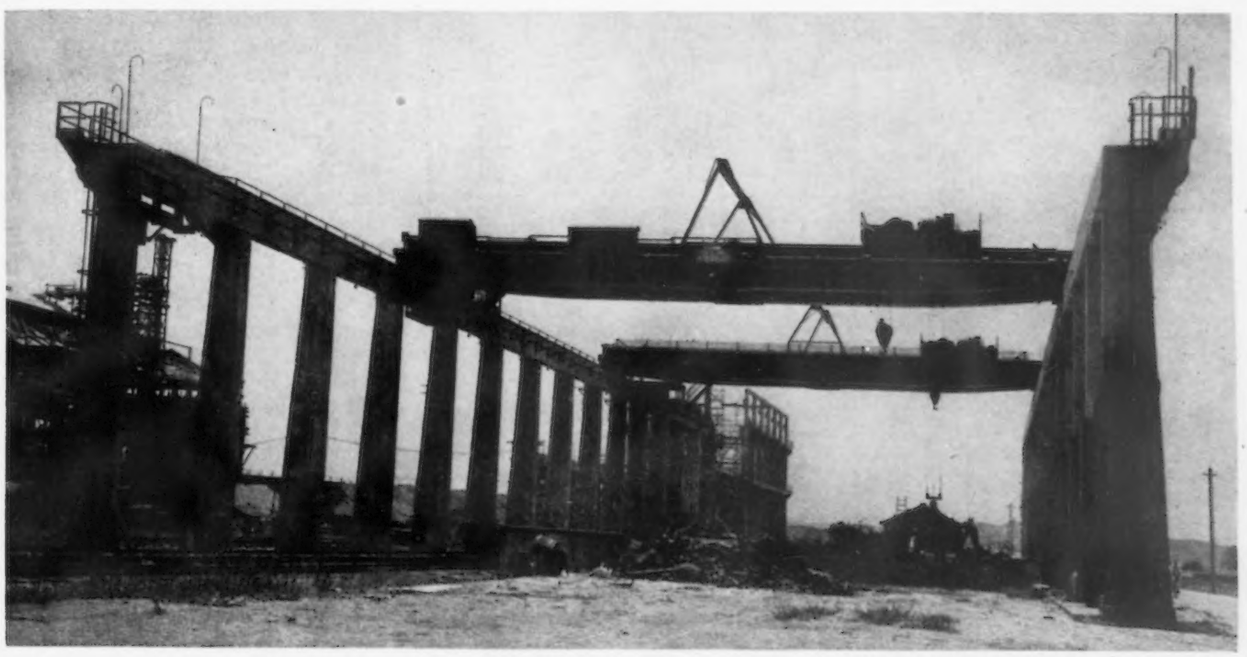
Volta Redonda Plant to Boost Brazilian Steel Supplies

New York

• • • **The Volta Redonda** steel plant, located 150 miles from Rio de Janeiro, was designed to develop Brazil's resources of ore, coal and manganese.

The picture directly below shows a general view of the plant. The principal blast furnace, next shown, produces pig iron from some of the richest iron ore in the world (about 62 pct iron, average). The iron ore, limestone and dolomite, and manganese ore sources are located within 250 miles of the plant; furnishing coal presents a more difficult problem.

Scrap iron handling is taken care of by the 10-ton crane, illustrated in the last photo.



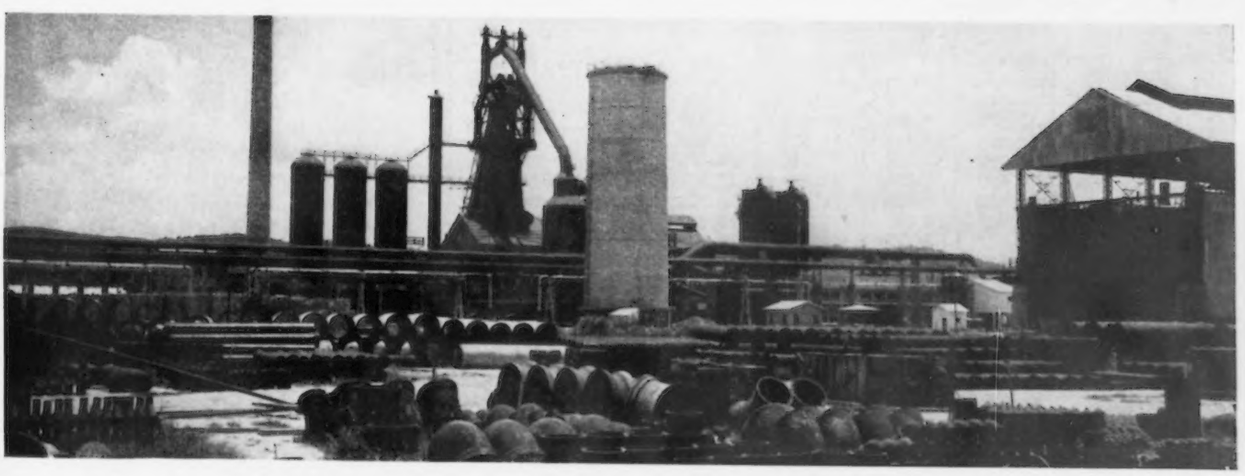


TABLE I—Production of Iron Ore and Ironstone
(in thousands of tons of 2240 lb)

District	1937	1942	1943	1944	1945
West Coast	856.9	615.5	596.1	534.8	405.8
N. Yorkshire	2,036.7	1,884.5	1,756.5	1,508.5	1,199.1
N. Lincolnshire	3,046.7	3,671.8	3,271.4	3,085.8	2,688.5
Midland	7,835.5	13,337.6	12,534.1	10,158.0	9,731.9
Other	439.2	396.2	335.6	184.6	149.6
Total	14,215.0	19,905.6	18,493.7	15,471.7	14,174.9

TABLE II—U.K. Imports of Iron Ore, (excluding Magniferous) by Country or Consignment
(Compiled from the Board of Trade Returns)
(In thousands of tons of 2240 lb)

Country of Consignment	Monthly Average		Monthly		
	1944	1945	1944	1945	
			Dec.	Nov.	Dec.
Sierra Leone	40.4	66.3	40.2	50.5	34.1
Newfoundland	1.6	27.1	19.5	6.7	37.1
Other British Countries	0.3	0.4	0.2	0.7	0.4
Total—British Countries	42.3	93.8	59.9	57.9	71.6
Algeria	53.1	91.3	56.4	121.6	43.4
Tunis	....	6.9	....	5.4	....
Spain	17.2	18.9	10.4	15.7	24.5
Spanish Ports in North Africa	47.7	51.1	40.9	50.4	28.1
Brazil	20.0	24.1	8.6	35.4	17.4
Sweden	0.7	52.6	....	105.2	124.9
Other Foreign Countries	0.7	0.8	....	3.8	1.2
Total—Foreign Countries	138.7	245.7	116.3	337.5	239.5
Grand Total—Tons (000's)	181.0	339.5	176.2	395.4	311.1
Value (£000's)	761.2	1,232.8	720.1	1,320.8	972.9

TABLE III—Supplies and Consumption of Steel
(in thousands of tons per annum: ingot equivalent)

Period	Home Production	Imports	Total Available	Total Deliveries	Export	Home Deliveries
1937	12,984	1,483	14,467	14,542	2,921	11,621
1938	10,398	975	11,373	11,223	1,985	9,238
1939	13,221	1,525	14,746	14,546	1,735	12,811
1940	12,975	3,356	16,331	15,231	1,286	13,945
1941	12,312	3,658	15,970	14,564	526	14,038
1942	12,942	2,407	15,349	15,956	274	15,682
1943	13,031	2,773	15,804	16,005	122	15,883
1944	12,142	1,668	13,810	14,328	240	14,088
1945	11,826	173	11,999	12,514	674	11,840
1945:						
1st Quarter	12,127	413	12,540	13,292	188	13,104
2nd Quarter	11,815	17	11,832	12,679	394	12,285
3rd Quarter	10,990	74	11,064	11,639	824	10,815
4th Quarter	12,372	189	12,561	12,446	1,288	11,158

Notes Change in British Ore

London

• • • **British iron ore** production in 1945 was the same as in 1937 at just over 14 million tons, according to statistics compiled by the British Iron & Steel Federation. The distribution of the Federation Statistical Bulletin for January marks the resumption of the series suspended as of July, 1939, containing new pig iron production figures for 1945, as well as the ore statistics.

The bulletin indicates a change in the distribution of ore production between 1937 and 1945, although the total output remains about equal. The Midlands ore fields, comprised of South Lincolnshire, Leicestershire, Northamptonshire, Oxfordshire and Rutlandshire, accounted for almost 70 pct of the total production in 1945 compared with only 55 pct before the war.

Table I indicates the prewar and wartime production of ore inside Britain, while table II indicates the volume of imports of ore during 1944 and 1945.

Supplies of iron ore imported into Britain were reduced during the war to about a quarter of the 1937 figure, but increased substantially in the second half of 1945, and the figure reached more than 4 million gross tons. While this was nearly double the 1944 arrivals, it was only 60 pct of the 1937 import. Limiting factors in the closing months of the year were the dock strikes and the interruption of shipping schedules.

Increased arrivals of imported higher grade ores in the past year made possible an improved production of pig iron at 7,107,400 gross tons, compared with 6,736,500 gross tons in 1944. The additional victory holidays and a somewhat localized coke shortage kept the total 1,400,000 gross tons below the 1937 figure. According to the Federation, 1946 production will depend on both the arrival of imported high grade ore, and the availability of fuels.

Distribution of Output

By JACK R. HIGHT

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The output of ingots and steel for castings in 1945 was 11,819,900 gross tons, according to the final figures. Earlier estimates had been that production would total 11,750,000 gross tons (THE IRON AGE, Jan. 3, 1946, p. 157). This figure represents a decline from 12,142,200 gross tons in 1944, reflecting again the extra holidays (5 working days) and the decreased demand for electric steel.

The general steel production picture is summarized in table III, showing supplies and consumption in terms of ingot equivalent.

In a discussion of the production figures for other countries, the Federation points out a large expansion of steel output in the British Dominions and India. These increases vary from 55 pct in the case of India to 100 pct in the case of Canada. The considerable expansion of capacity outside Europe is compared strikingly with the situation in Western Europe, as shown in table IV.

The neutrals, Sweden and Spain, were the only countries to maintain their production at approaching prewar levels. Production in France and Belgium during the war years was reduced to an average of about 25 and 35 pct of the prewar figure respectively, and to very much lower levels in 1944-1945. In recent months there has been a rapid recovery in these countries, but the level of output at the end of November 1945, was still appreciably lower than that of 1937. In Luxemburg it was at 22 pct of the prewar level, France 30 pct and Belgium 32 pct—all held down primarily by a shortage of fuel.

Production of pig iron and steel ingots in Italy during the war years was maintained at a fairly

TABLE IV— Western European Production

(annual rate in millions of tons of 2240 lb)

	Pig Iron and Ferroalloys			Steel Ingots and Castings		
	1937	Average 1940-44	Latest Month 1945 (Annual Rate)	1937	Average 1940-44	Latest Month 1945 (Annual Rate)
France	7.8	1.4*	2.0 (Nov.)	7.8	2.0*	2.7 (Nov.)
Belgium	3.7	1.3	1.0 (Oct.)	3.8	1.4	1.4 (Oct.)
Luxemburg	2.5	...	0.6 (Nov.)	2.5	...	0.5 (Nov.)
Sweden	0.7	0.8	0.6 (Oct.)	1.1	1.2	1.3 (Oct.)
Spain	0.1†	0.6	0.5 (Oct.)	0.2†	0.6	0.4 (Oct.)

* Average of 1941-44, excluding Alsace Lorraine.
† Figures for Spain in 1937 are low because of the Civil War.

TABLE V—Italian Production

(in million metric tons of 2205 lb)

Year	1939	1940	1941	1942	1943	1944	1945
Pig Iron	0.8	1.0	1.0	1.0	...	...	...
Steel Ingots and Castings	2.2	2.3	2.0	1.9	1.9	1.1	0.3

TABLE VI—Deliveries of Alloy and Nonalloy Finished Steel

(in thousands of tons of 2240 lb)

	WEEKLY AVERAGE				
	1944	1945	1944	1945	
			Dec.	Nov.	Dec.
U.K. Production (incl. material for further conversion)					
Heavy Rails and Sleepers	6.5	7.1	6.2	8.3	10.3
Heavy and Medium Plates	30.8	26.4	26.5	30.5	28.3
Plates—Alloy	1.9	1.1	1.5	0.4	0.6
Other Heavy Steel Products (inc. shell steel)	38.2	33.1	33.9	30.3	29.0
Light Rolled Products (excl. wire rods and alloy steel bars)	46.2	41.9	44.3	48.6	39.7
Ferroconcrete Bars	2.1	1.8	0.7	2.6	2.0
Cold Rolled Strip (excl. alloy)	4.2	4.0	3.2	3.8	3.3
Bright Steel Bars (excl. alloy)	4.9	3.9	3.9	3.7	3.2
Sheets, Coated and Uncoated (excl. alloy)	21.2	20.2	19.0	21.4	17.8
Tin, Terne and Blackplate	10.0	9.5	9.5	9.8	9.5
W.I. and Steel Tubes, Pipes and Fittings—Non-Alloy	12.3	10.9	10.0	11.9	11.6
Steel Tubes, Pipes and Fittings—Alloy	0.6	0.3	0.3	0.1	0.2
Mild Steel Wire (excl. alloy)	9.6	7.9	7.7	8.5	7.0
Hard Steel Wire (excl. alloy)	2.6	2.3	2.2	2.6	2.2
Alloy Bars, Sheets, Strip and Wire	5.6	3.0	3.6	2.7	2.3
Steel Tyres, Wheels and Axles	2.6	2.5	2.4	3.1	3.1
Steel Drop Forgings—Non-Alloy	3.8	3.5	3.6	2.6	2.3
Steel Drop Forgings—Alloy	3.0	1.6	2.1	1.1	1.0
Other Steel Forgings—Nonalloy	2.1	1.8	2.0	2.0	2.1
Other Steel Forgings—Alloy	2.0	0.6	1.3	0.5	0.4
Steel Castings—Nonalloy	5.1	4.1	4.5	3.1	2.7
Steel Castings—Alloy	1.7	0.9	1.3	0.6	0.5
Total—U.K. Production*	217.0	188.4	189.7	198.2	179.1
Less Intra-Industry Conversion	24.5	17.8	21.8	18.8	15.2
Total—Net U.K. Deliveries	192.5	170.6	167.9	179.4	163.9

* Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.

steady rate until 1943, when a loss of territory, destruction of some works by bombing, and the dismantling of equipment by the Germans reduced output considerably. According to the bulletin, production ceased entirely in April 1945. Table V indicates the progress of Italian output during the war years.

Table VII summarizes the ore, pig iron, scrap, steel and stockpile positions up to the end of 1945. Table VI breaks down the deliveries of various steel products during 1944 and 1945.

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TABLE VII

General Summary of the U.K. Position

(in thousands of tons of 2240 lb)

	WEEKLY AVERAGE						Steel† Stocks
	Iron Ore		Pig Iron	Scrap	Steel		
	Home Production	Consumption of Imported Ore	Production (All qualities) including Ferroalloys	Consumption in Steel Making	Production of Ingots and Steel for Castings	Net Deliveries of Finished Steel*	Held by Producers and in B.I.S.C. Stockyards
1944	297.6	46.8	159.5	141.7	233.5	197.5	2,171.0
1945	272.5	77.2	136.7	138.5	227.3	171.6	1,683.9
1944 December	266.0	52.2	132.7	132.4	219.7	169.1	1,697.5
December	231.4	100.4	145.5	132.3	221.7	164.0	1,190.6

* See table VI.
† Stocks at the beginning of the years and months shown.
‡ Including material in transit.

Says Wage Increases Pass Cost of Living

Cleveland

• • • **Wage increases** in both office and factory employment have surpassed the increase in the cost of living since Jan. 1, 1941, according to a survey made by the Associated Industries.

Wage and salary regulations issued by Stabilization Administrator Bowles provided for the approval of wage increases necessary to make the average increase since Jan. 1, 1941 equal the percentage increases in the cost of living between Jan. 1941 and Sept. 1945. "For the purpose of this section," the regulations declare, "this percentage increase in the cost of living shall be deemed to be 33 pct."

By way of comparison, the companies reporting were divided into three groups: Those employing less than 100 people, those employing from 100 to 500 and those employing more than 500. Separate statistics were compiled on office and factory help.

Results showed that among the small plants employing less than 100, office wages increased 35 pct from 1941 to 1945 and shop wages increased 46.3 pct. Among those employers having from 100 to 500 employees, office wages increased 38.5 pct and shop wages 44.5 pct. Among the larger employers the office wages increase was 38.4 pct and the shop wage increase was 48.7 pct. All office averages were 38.3 pct, those in the shops 48 pct.

Under the stabilization regulations, "cost of living" increases are among those termed "approvable," and may be taken into consideration in determining price or rent ceilings.

Machinery Price Rises Not Seen Immediately

Washington

• • • **Reports that OPA** is planning to lift price control on machinery and equipment have left doubts in industry circles that this will be done soon. It is known that early removal of control on several machinery items has been definitely decided upon but industry-wide removal, while in contemplation, is generally expected not to be an early prospect. However, there are strong government sources which are in favor of immediate removal of price control of all producer and capital goods. Included in this category are John W. Snyder, Director of the Office of War Mobilization and Reconversion, and John D. Small, OPA Administrator.

Meanwhile, additional price increases expected to be announced by OPA this week include a 10 pct increase for containers, approximately 9 pct for cast steel rolls and approximately 16 pct for all ferrous forgings.

Recommends CPA-OPA Merger

Washington

• • • **Consolidation of production** and price controls within a single agency through reorganization of the CPA and OPA was recommended in the formal report on Mar. 14 submitted to Congress by the special Senate committee to Study and Survey Problems of Small Enterprises.

Making it clear that it did not want maximum average price control discarded until a suitable substitute could be devised, the report held that consolidation of the functions of the two agencies would work toward quicker abandonment of MAP policies.

Offers Priority Assistance

Washington

• • • **CPA has issued Direction 11** to the general steel preference Order M-21 permitting steel warehouses to apply for priorities assistance to obtain tobacco flue sheets from steel mills through the use of the symbol "TPS." Where steel producers are booked to capacity, CPA may establish space reservations on their books for the production of this type of sheet when an order carrying the "TPS" symbol is tendered to them by a steel warehouse authorized to use this symbol by the Dept. of Agriculture.

WAC Sets Depreciation Rates for Three Types Of Surplus Machinery

Washington

• • • **Effective on Mar. 8,** a revision of WAC Regulation 13 extended the fixed price disposal formula to include additional classes of government surplus equipment.

The expanded formula, originally known as the "Clayton" formula when it applied only to machine tools, sets depreciation pricing rates according to length of active service.

Also, the revised regulation declares as commercially unsalable all surplus machine tools and machinery with more than 25 yr of active life. These items will be disposed of as scrap after all salvageable components have been removed. At the same time, a master list is being established which will classify certain types of specialized war production equipment as unsalable except as scrap.

The already existing 5 pct discount from the fixed price now allowed purchasers who do not own the plants in which the equipment is located at the time of sale will continue in effect for all classes of surplus equipment under the enlarged price schedule. Since all sales are f.o.b. the place of sale, the differential tends to equalize prices for outside buyers.

Additional machinery brought under the fixed price disposal formula is separated into three general classes as follows for pricing under the formula (numbers are those of vol. I, Standard Commodity Classification, May 1943):

Class I: 33-6000 through 33-6290, woodworking machinery; sawmills (complete units) and sawing machines; 33-6930, cooperage machinery; 33-6940, wood box and crate machinery; 33-6950, portable woodworking power-driven machinery.

Class II: 31-21121 through 31-21124, compressors, including stationary, portable, double-acting, single and double-stage power units; 31-2120, rotary compressors; 31-211121, single stage stationary compressors (except tank-mounted); 31-211141, double-stage stationary compressors (except tank-mounted); 32-1100, generators (for ac only); 32-1300, electric motors (for ac only).

Class III: 31-1511 and 31-1512, engines and turbines (fuel injection, liquid and air-cooled, compression ignited); 31-1521, same but surface ignition; 31-1530, same but spark ignition; 31-1541 and 1542, same, carburetor type, liquid and air-cooled; 31-1511 through 31-1551 and 1552, same, mixing type valve, liquid and air cooled; 31-211122, same but not tank-mounted; 31-211130, compressors, double-stage, tank-mounted; 32-1230 through 1252, generator sets, diesel engine powered, carburetor engine powered, and gas-turbine powered, all for ac only.

At the same time, classifications 34-50000 to 59999 (welding machinery and equipment) were dropped from the fixed price disposal lists.

Percentages to be used in computing sale prices of the machinery in classes I and II are set forth in the extended Clayton formula (THE IRON AGE, Nov. 15, 1945, p. 124) covering equipment up to 25 yr of active service. A new table B is provided to cover any machine in class III which operates under 750 rpm, and table C which applies to any class III equipment operating at speeds greater than 750 rpm.

The percentages in column (b) of tables B and C are to be used in computing sales prices when the buyer is the person using or having last used the item; column (a) is to be applied where the sale is to any other purchaser.

When the length of active service of machinery in class III exceeds that specified in the tables, sale is made at the best prices obtainable but not in excess of the price applicable to such a machine with the highest period of active use specified in the tables.

Storage and warehousing costs usually exceed the dollar return on surplus machinery with more than 25 yr of active service, WAC stated, and considerable quantities of materials of this type now classed as scrap are occupying needed storage space. Provision is made, however, for the donation of such equipment to approved tax-exempt non-profit educational and charitable institutions.

In connection with the sale of any machinery as scrap, the disposal agency is directed to first remove all components which may be deemed as having sufficient resale value to warrant removal, handling and storage.

Table C

Period of active use	a Pct	b Pct
Less than one month	85.0	90.0
1 month	75.0	80.0
2 months	68.0	73.0
3 months	64.4	69.4
4 months	61.2	66.2
5 months	58.0	63.0
6 months	54.8	59.8
7 months	51.6	56.6
8 months	48.4	53.4
9 months	45.2	50.2
10 months	42.8	47.8
11 months	40.6	45.6
12 months	38.6	43.6
13 months	37.0	42.0
14 months	35.8	40.8
15 months	35.0	40.0
16 months	34.6	39.6
17 months	34.2	39.2
18 months	33.8	38.8
19 months	33.5	38.5
20 months	33.2	38.2
21 months	32.9	37.9
22 months	32.6	37.6
23 months	32.3	37.3
2 yr	32.0	37.0
3 yr	28.0	33.0
4 yr	24.0	29.0
5 yr	20.0	25.0

Table B

Period of active use	a Pct	b Pct
Less than one month	85.0	90.0
1 month	80.0	85.0
2 months	75.0	80.0
3 months	70.0	75.0
4 months	68.0	73.0
5 months	66.0	71.0
6 months	64.4	69.4
7 months	62.8	67.8
8 months	61.2	66.2
9 months	59.6	64.6
10 months	58.0	63.0
11 months	56.4	61.4
12 months	54.8	59.8
13 months	53.2	58.2
14 months	51.6	56.6
15 months	50.0	55.0
16 months	48.4	53.4
17 months	46.8	51.8
18 months	45.2	50.2
19 months	44.0	49.0
20 months	42.8	47.8
21 months	41.6	46.6
22 months	40.6	45.6
23 months	39.6	44.6
24 months	38.6	43.6
25 months	37.8	42.8
26 months	37.0	42.0
27 months	36.2	41.2
28 months	35.8	40.8
29 months	35.4	40.4
30 months	35.0	40.0
31 months	34.8	39.8
32 months	34.6	39.6
33 months	34.4	39.4
34 months	34.2	39.2
35 months	34.0	39.0
3 yr	33.8	38.8
4 yr	31.8	36.8
5 yr	29.8	34.8
6 yr	27.8	32.8
7 yr	25.8	30.8
8 yr	23.8	28.8
9 yr	21.8	26.8
10 yr	19.8	24.8

European Letter

(CONTINUED FROM PAGE 86)

and inorganic coatings on steel. Pickling, cleaning, tinning, galvanizing, vitreous enameling, phosphate treatment, and what they mean to the steel involved will all be within its scope. Hopes are that the station will embrace both fundamental and applied research. The aid of consumer groups, including both vitreous enamelers and tinplate users has already been enlisted.

Typifying the effort Sir Charles is directing to include outsiders in the research are the plans being considered for a Metal Flow Research Station, which would include nonferrous metals and also mill machinery makers. These efforts to make the studies truly cooperative and representative of all the parties concerned represent what Sir Charles likes to consider one of the fundamental concepts of the organization. Although I was unable to get a final confirmation from the director on the establishment of the Metal Flow Station, a meeting has been called of all the interested parties, and its future seems assured.

Although the plan for this group at the moment includes only the representation mentioned, it will probably at some time in the future also include steel users (automobile manufacturers are particularly interested in this question) and possibly nonferrous metals users as well.

I was interested to note Sir Charles' compromise effort to get publication of the results of all this work as early as possible. He is at present thinking in terms of an intermediate stage of "confidential publication" in report form for preliminary findings. He is hopeful that the use of such a program will help to break down the universal reluctance over here to early publication of anything.

His theory is that the limited publication of such studies in some rough form would promote the trial of new methods by other firms. Their comments then might offer encouragement and direction to later general publication, presumably in the trade press.

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Supplies Swiss Needs

Barcelona

• • • **Reports reaching** here indicate that the Swiss watch industry will be supplied with all its alloy steel for the next 18 months by Sweden. Included in the arrangement are five Swedish manufacturers, among them August Stenman of Elskituna and the Sandviken Jernverk.

Swiss needs for other steel products are to be partially met by France under the terms of a recently negotiated trade agreement. It is believed that delays will be prevalent in the case of these orders in view of the low rate of steel production in French mills at the present time.

ALMOST A GI BRIDE

Transatlantic Daily Mail

French Increase Steel Tube Production 20 Pct

Paris

• • • **French production** of steel tubes in January 1946, 8500 metric tons, represents a 20 pct increase over the previous month, according to statistics released by the Ministry of Industrial Production. Production of wire for the same period amounted to 13,000 tons against a total of 12,000 tons for the previous month, an increase of 7 pct. The production of drawn and cold-rolled products for January were both maintained at their December level, representing respectively 54 pct and 43 pct of the 1938 average monthly production. In the following table, all figures are in metric tons.

	Monthly average 1938	December 1945	January 1946 estimated
Steel tubes	15,200	6,742	8,509
Wire products	58,800	12,000	13,000
Drawn products...	8,300	4,500	4,500
Cold rolled	5,800	2,466	2,500

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Spain to Export Iron Ore

Barcelona

• • • **Increased shipments** of iron ore from Bilbao and Marroc in Spain to Italy are a feature of the new trade agreement negotiated with Italy. The initial quantity mentioned is 350,000 metric tons of ore.

Exports recently arranged for finished steel products include minor quantities to Chile and Argentina. The agreement with Argentina calls out 2000 tons of black sheets, 1300 tons of plates, 600 tons of wire rods, and 650 tons of miscellaneous items. In the agreement with Chile for a 1-yr period about 2700 tons of various items are specified.

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Canadian Steel Rate Up

Toronto

• • • **Production of steel ingots** and castings in Canada for January totaled 244,623 net tons or 81 pct of rated capacity and compares with 219,281 tons or 72.6 pct in December and with 268,722 tons in January 1945. Output in the month under review included 236,479 tons of ingots and 8,144 tons of castings.

Steel furnace charges in January included 122,526 tons of pig iron, 73,237 tons of scrap of consumers own make, and 72,659 tons of purchased scrap.

New York Air Brake Backlog at High Level

New York

• • • **While the** backlog of The New York Air Brake Co. has declined slightly since the end of 1945, unfilled orders remain at a high level and represent more than seven months' shipments at the present capacity rate of operations, according to L. R. Burch, president.

Total sales declined somewhat in the first two months of 1946, as compared with the same period of last year caused by the elimination of war products it was said. Sales of regular products were approximately equal to those for the first two months of 1945. Earnings before taxes reflected the reduction in sales. Because of the elimination of the excess profits tax, earnings after taxes were somewhat greater than for the first two months of 1945, said Mr. Burch.

It was reported that a new labor agreement has been signed effective Feb. 25 providing for wage increases. Adjustments have also been made in the compensation of office employees. These increases were not reflected appreciably in earnings for the first two months of the year.

Canada Produces More Pig Iron in January

Toronto

• • • **Pig iron production** in Canada started to move upward with the beginning of this year when January output amounted to 143,685 net tons, or 62.2 pct of total rated capacity, compared with 135,225 tons or 58.5 pct in December. For January 1945 production totaled 155,969 tons. For the month under review output of pig iron included 116,558 tons of basic iron, of which 2169 tons were for sale and the balance for further use of producing companies; 16,255 tons of foundry iron and 10,872 tons of malleable iron, all the latter two grades being for sale.

During January one additional stack was blown in, making nine furnaces in blast and five blown out. Charges to blast furnaces in January included 262,203 tons of iron ore, 19,190 tons of mill cinder, scale, sinter, etc. and 4167 tons of scrap iron and steel.

Production of ferroalloys in January dropped sharply to 10,878 net tons, compared with 15,456 tons in the previous month and with 12,130 tons in January a year ago. During the month the following alloys were produced: ferrosilicon, silicomanganese, ferromanganese, ferrochrome, chrom-x, and ferrophosphorus.

Weirton Steel Co. Gets Naval Ordnance Award

Weirton, W. Va.

• • • **The Naval Ordnance** Development Award will be presented to the Weirton Steel Co., and also to selected departments and employees of the company at a ceremony to be held here on Thursday, Apr. 11.

The Weirton Steel Co. will be the first company in the steel industry, and one of the few in the country, to receive this award which was created by the Navy Dept. recently, according to Vice-Admiral G. F. Hussey, U. S. N., chief of the bureau of ordnance, to recognize "distinguished service to the research and development of naval ordnance."

The particular contribution for which the steel company is receiving the honor is work in connection with the development of a new and revolutionary naval torpedo battery. In this project, the Weirton Steel Co. collaborated with the Edison General Electric Appliance Co., Inc., which will also receive the award.

The Weirton Steel Co. contributed to the torpedo battery project by developing processes for the rolling of magnesium and silver chloride into sheets of very thin gage. Precise control of temperatures and specialized techniques required in various operations were evolved through tedious research and experimental production. Because of the difficult operating problems and rigid specifications calling for an extreme degree of "flatness" and freedom from even minute surface defects, production of the materials in quantity was considered impossible at the start of the project. Operations were perfected, however, that made it possible to supply on schedule the required quantities of both magnesium and silver chloride thin gage sheets.

Crucible Reports Loss Of Over $1.5 Million

New York

• • • **Crucible Steel Co.** spent $3,279,641 in 1945 for improvements in company properties, the more important of which included agricultural steel facilities, a railway spring plant, river coal transportation equipment and additions to warehouses. In 1944, $2,195,111 was expended for improving facilities. The company's annual report also announced plans for needed changes and additions to other plants. This plan for additional facilities when completed and finally approved will require cash disbursements of not less than $10 million over the next two years.

For the year the company sustained a net loss of $1,565,847, but by reducing its contingency reserve and by carryback provisions in the internal revenue code, the company did add $4,813,387 to earned surplus.

Wages and salaries for 1945 amounted to $61,600,000 as compared to $76,600,000 in 1944.

Canadian Exports Reach $366 Million in 2 Yr

Ottawa

• • • **Canadian products** valued at more than $366,000,000 have been purchased by more than 20 agencies and countries in the past two years, through the Canadian Export Board. France has been the largest purchaser of Canadian goods, buying approximately $133,000,000 worth, and was followed by UNNRA, $62,000,000, Belgium $50,000,000, Australia $18,400,000, the Netherlands $15,300,000, the United Kingdom $12,000,000, Norway $6,400,000, British Colonies $5,500,000, New Zealand $4,500,000, while various other countries and agencies purchased goods in values ranging from $15,700 to $3,300,000. The greatest expenditures were on iron and steel products, including the following:

Motor vehicles and tires	$89,045,000
Box and flat cars	40,853,000
Locomotives	37,585,000
Agricultural machinery	13,622,000
Electrical equipment	5,367,000
Industrial equipment and machinery	3,260,000
Hardware	1,478,000
Welding equipment	735,000
Automotive parts	655,000
Aluminum	495,000

OPA Lists Questions And Answers Explaining Wage-Price Policies

Washington

• • • **Additional questions** and answers set up by Chester Bowles in order to explain some of the aspects of the new wage-price policy are given below. This concludes the list printed in THE IRON AGE, Mar. 14, p. 112.

Question: What classes of wage or salary increases are given advance approval by the President's Executive Order itself?

Answer: The President's Executive Order gives advance approval to two classes of wage and salary increases: (1) Any increase lawfully made before the date of the order (Feb. 14, 1946) and (2) any increase made at any time in accordance with a governmental recommendation announced before the date of the order. The National Wage Stabilization Board and the salary stabilization unit in the Treasury Dept. will give rulings, upon request, on questions as to whether a particular increase under their jurisdiction falls within one of these classes.

Question: What additional classes of wage or salary increases are given advance approval by the new wage-price regulations?

Answer: (1) Increases made by employers who employ no more than eight employees, unless wages for such employees have in the past been determined by a master contract, or by similar or identical contracts, on an industry or area-wide basis, or unless the National Wage Stabilization Board provides for specific approval in the particular type of case; (2) increases providing for a maximum of six paid holidays a year; (3) increases providing for nightshift differentials not exceeding 5¢ for a second shift or 10¢ for a third shift; (4) increases providing for paid vacations of no more than one week after 1 yr of employment and two weeks after five years of employment; (5) in addition, the regulations authorize the wage or salary stabilization agencies to issue pattern orders, or other general orders, which will give advance approval to a much larger number of in-

(CONTINUED ON PAGE 134)

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These Malaysians are removing stone, gravel and other extraneous material from tin concentrates by the flotation process. With lead supplies dwindling critically, this is indeed a welcome sight so that tin coatings can replace the lead that replaced the tin.

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VA Recognizes State Approved Apprentice Training Committees

Washington

• • • **Wider opportunities** for veterans, disabled or otherwise, to learn recognized trades and crafts under the amended Servicemen's Readjustment Act (GI Bill of Rights) are provided in a new Veterans Administration program.

The program applies to all standard apprentice courses in the building trades, railroad shop crafts and industries in which joint labor-management committees are or may be charged by the states with the responsibility for controlling apprenticeship training.

Authorized in VA Circular 30, the program results from the VA ruling that all state-approved joint apprenticeship committees or similar labor-management committees now may be recognized as educational or training institutions within the meaning of the law.

The circular explains that liberalized rules under the program permit each joint committee to:

(1) Accept applicants for apprenticeship training.

(2) Determine the establishment or establishments in which the training is to be provided.

(3) Arrange for the placement of each applicant in the chosen establishment.

(4) Determine that each establishment is providing the prescribed course in accordance with accepted standards and that each applicant is applying himself diligently to the course and is accomplishing its purpose efficiently.

The circular emphasizes VA will presume that all such arrangements are made with the full agreement of management and labor and the joint committees have become the accepted means through which all applicants are started on and carried through a standardized course of apprentice training.

"As a rule," the circular states, "such joint committees do not actually give education in the strict sense of the term, since the education is being provided by business establishments.

Industrial Coal Stocks In Good Supply at Some Steel Company Plants

Pittsburgh

• • • **Industrial coal** stocks in the Pittsburgh - Wheeling - Youngstown areas are considerably more comfortable than just prior to previous coal contract negotiations with their consequent strike threats. During the steel strike most steel companies found ways and means of laying coal down in their yards or close to their mills, and, with a month of no consumption, stocks are pretty well built up.

Of the three steelmaking areas, Pittsburgh is in apparently the worst shape, with some companies reporting their stocks as less than two weeks' full operations. In the Youngstown and Wheeling districts, a supply that is equivalent to better than a month at full operations has been stocked by the steel companies. This could mean that steelmaking operations could be prolonged considerably beyond a month, should operations be curtailed immediately upon the calling of a coal strike.

If a coal strike is called and drawn out to a bitter end, as many observers expect, steel production would immediately suffer from a tonnage standpoint, but it may be many, many weeks before the mills would be forced to close down completely. In fact, it is doubtful that a strike of sufficient duration to completely shut down the steel industry would be tolerated by the public or the government, since it would undoubtedly mean a strike of better than two months.

As usual, steel producers are very hesitant to place an exact value in terms of days' full operations upon their coal stocks. However, during the steel strike the agreement between the mills and the CIO United Steel Workers of America to lay coal down in the yards did build up supplies. This unquestionably worked to the disadvantage of the United Mine Workers and John L. Lewis, undoubtedly much to the joy of the CIO.

As a matter of fact, Lewis is going into a coal strike in a far worse position with regard to stocks of coal at steel plants than he has in many years. A close control of coal stocks in the past has assured the mine workers that a strike at the time their contracts were up for negotiation found steel companies in a rather tight fix for coal.

There are some who point to the AFL's past performance of getting its demands without striking, hoping that John L. Lewis, with his miners, will follow this same plan. It is pointed out, however, that the miners' demands are such that, if they adhere to them, there will probably be no chance of averting a strike. Consequently, among industry observers there are very few who do not anticipate a coal strike next week, and it may be one of the worst in history.

Westinghouse Earnings Up $2 Million in 1945

Pittsburgh

• • • **Although the war's end** and the reconversion process reduced Westinghouse Electric Corp.'s 1945 billings to a level 18 pct below 1944, they were nearly double the company's best prewar year of 1941. Net income continued at a low rate in 1945, amounting to only 3.9 pct of net sales billed, it was disclosed in the company's annual report to stockholders.

In a statement supplementing the report, Gwilym A. Price, Westinghouse president, pointed out that the 1945 net sales of $684,730,060 compared with $830,480,435 in 1944 and $709,342,717 in 1943. Net income before taxes and postwar provisions amounted to $53,266,459 in 1945, compared with $104,444,260 for 1944 and $99,063,194 for 1943.

"After deducting the provisions for federal income and excess profits taxes and for postwar contingencies accrued during the war months of the year, net income in 1945 amounted to $26,800,766, compared with $24,919,622 for 1944 and $21,401,568 in 1943," Mr. Price reported.

Emphasizing the narrow margin on which present day business is conducted, Mr. Price pointed out the radical reduction in the ratio of net income to sales volume which has occurred in the past 16 yr. In 1945, net income was only 3.9 pct of billings, as against 6.3 pct in 1941, almost 10 pct in 1937, and 12½ pct in 1929. As a result of this trend, Mr. Price said, management today finds itself with less elbowroom than ever before. Mistakes and extravagances are more heavily penalized. Economy and efficiency are more necessary.

NAZI POWER MAN: *Here is Friedrich Flick called by U. S. authorities the greatest single power behind the Nazi war machine. He is guarded by T/5 David Petrovich of Chicago as Flick works on reports for U. S. investigators.*

Laclede Steel Net Higher

St. Louis

• • • **Slightly higher** net income for 1945 than for 1944 has been reported by Laclede Steel Co. and subsidiaries. Earnings in 1945 were $320,215 compared with $318,966 in 1944.

William M. Akim, president, reported that major improvements which had been deferred during the war now are being undertaken and that increased production soon will result. Additional wire drawing machines will start production in the second quarter of 1946, and a new rod mill is slated to begin operation early in 1947, he stated. He described the 1946 sales outlook as good.

Industrial Briefs...

• NEW CORPORATION—Cleveland Wrench Co. has opened office and sales headquarters at 1836 Euclid Ave., Cleveland. Manufacture of patented combination nut and pipe wrench is contracted out to other firms. Warehouse space will be leased soon for shipping and storage operations. Officers are Albert J. Loeb, president; C. A. Taylor, vice-president; attorney, Cecil H. Kopperman, secretary-treasurer. The company is establishing national sales territories and will engage in export trade also.

• NEW INDUSTRY—Nelson-Warner Mfg. Co., Inc., is planning to manufacture magnesium or aluminum rolls for cloth which are used in rayon mills and by textile plants, according to principals, T. J. Nelson and J. D. Slagor, both of whom are connected with Pearl Machine & Tool Co., Cleveland. Plans are indefinite until a plant location can be found.

• MERGER — Stockholders of Michigan Die Casting Co. of Detroit and Gerity-Adrian Mfg. Corp. of Adrian, Mich., have approved a merger of the two companies. Gerity-Michigan will maintain offices at Detroit and Adrian. Die casting facilities will be continued at 8651 East Seven Mile Road, Detroit. Plating will be done at the two Adrian plants.

• PLANS EXPANSION—Oakwood Tool & Engineering Co., Dayton, plans to build a new building and purchase additional machinery, as well as enlarge the engineering department. A. F. Leis has been named general manager.

• MOVES OFFICES—Soule Equipment Co., industrial machinery subsidiary of the Soule Steel Co. of San Francisco, has moved into larger quarters at Seventh and Ferry Sts., Oakland. The new site comprises about five acres, with direct spur track and 32,000 sq ft under roof. Howard L. Stilley is general manager.

• CREATES NEW UNIT—Borg-Warner Corp. is establishing a new unit known as the Norge-Heat div., it was announced by C. S. Davis, president of the corporation. He announced that Howard E. Blood, head of the corporation's Norge and Detroit Gear Div., has been named president of Norge-Heat.

• TC&I BUILDS—The Tennessee Coal, Iron & Railroad Co., Birmingham, will build a warehouse at Memphis, Tenn., to cost more than $300,000. Construction, which will be started as soon as materials become available, will require about six months, according to George R. Mitchell, TCI's Memphis district manager of sales, who will have charge of the warehouse.

• LARGEST TRUCK PLANT — Dodge division of Chrysler Corp. has started expanded truck manufacturing operations in a 369,600 sq ft addition to its plant on Mound Road, Detroit. The expanded plant now exceeds 1,273,000 sq ft of manufacturing space, the enlargement having been made to meet record-high demand for Dodge trucks.

• ACQUISITION—Chicago Metal Hose Corp., Maywood and Elgin, Ill., has acquired the Apex Machine Co., Elgin.

• STEEL PRODUCTS WAREHOUSE —Toledo Iron & Steel Co., Toledo, is converting the Gartland foundry into warehouse for steel products. Two overhead cranes are being installed and a railroad siding will be run into the plant. The building will furnish 35,000 sq ft in two separate rooms when remodeling is completed and is situated on a 5½-acre site. Edward Arenson is general manager.

Inventory Control Tightened at Firms Closed by Strikes

Washington

• • • **In an effort to** eliminate critical material shortages, inventory limitations on persons or plants whose operations are suspended due to work stoppages in their own or their suppliers plants have been further tightened, CPA has announced. This action was taken in an amendment to Direction 6 to PR 32, the inventory control regulation.

Under the amended direction the number of days before which a plant must adjust its orders for materials, other than iron or steel, has been reduced from 30 to 15. Orders for iron and steel must still be adjusted immediately.

The inventories permitted to be built up after the initial period have also been reduced. Such inventories are now limited to the smaller of the following amounts: (1) The minimum amount needed during the first 30 days after resumption of operations; or (2) the minimum amount which would have been required to meet the plant's production schedule during the 45 days following the date when the work stoppage occurred, if the plant had remained in operation. Previously plants were allowed to accumulate the amount of material they would need during the first 45 days after resumption of operations.

U. S. Pipe Adds $1.4 Million

Burlington, N. J.

• • • **Of the $799,000 spent** by United States Pipe & Foundry Co. for new facilities for the production of war material, $630,000 has already been amortized and the remainder either billed to the government or sold to outside companies.

Net sales of the company amounted to $22,148,241 in 1945 and $20,226,751 the previous year. Operating profit totaled $2,110,006 compared with $1,565,653 the previous year. Added to earned surplus in 1945 was $1,410,102. In 1944, $1,552,609 was added to this item.

Construction Steel...

New York

• • • **Fabricated steel awards** this week included the following:

7800 Tons, Peoria, Ill., Caterpillar Tractor Co. engine building, to American Bridge Co., Pittsburgh.

2300 Tons, Canyon Diablo, Ariz., Santa Fe RR bridge A-313, to Kansas City Bridge Co. and Kansas City Structural Steel Co., Kansas City, Kans.

1500 Tons, Milwaukee, Milwaukee RR fabricating shop, to American Bridge Co., Pittsburgh.

800 Tons, Philadelphia, manufacturing building for Michael Flynn Co., to Belmont Iron Works.

640 Tons, Black Fork River, Wyo., Union Pacific RR bridge, to Kansas City Structural Steel Co., Kansas City, Kans.

600 Tons, Malden, Mass., telephone exchange to Ingalls Iron Works.

570 Tons, Eau Claire, Wis., state highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

500 Tons, Cleburne and Cranbury, Tex., highway bridge to Virginia Bridge Co., Roanoke, Va.

300 Tons, Chicago, American Colortype Co., building, to Bethlehem Steel Co., Bethlehem, Pa.

300 Tons, Cornelia, Ga., International Furniture Co., plant, to American Bridge Co., Pittsburgh.

260 Tons, Harlingen or San Benito, Tex., state highway bridges, to Virginia Bridge Co., Roanoke, Va.

250 Tons, Granger, Wyo., bridge, to Kansas City Structural Steel Co., Kansas City, Kans.

230 Tons, Los Angeles, Santa Fe railroad bridges, to American Bridge Co., Pittsburgh.

200 Tons, Richmond, Va., transmission towers to Bethlehem Steel Co., Bethlehem, Pa., through Stone & Webster Engineering Corp., Boston.

200 Tons, Philadelphia, coal trestle for Reading Co., to American Bridge Co., Pittsburgh.

160 Tons, Los Angeles, Santa Fe railroad bridges, to Joseph T. Ryerson & Son, Inc., Chicago.

133 Tons, Montgomery City, Pa., bridge over Old York Road for Pennsylvania Dept. of Highways, LR 46118 Section 1, to Phoenix Bridge Co., Phoenixville, Pa.

125 Tons, Littleton, N. H., factory for Norton Pike Co., to American Bridge Co., Pittsburgh, through Morton C. Tuttle, Boston, contractor.

100 Tons, Newcastle, Wyo., bridge, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

• • • **Fabricated steel inquiries** this week included the following:

2000 Tons, Coulee City, Wash., steel tunnel supports, Main Canal, Columbia Basin Project, Spec. 1236, Bureau of Reclamation, Coulee Dam, Wash., bids due Apr. 15.

1800 Tons, Iowa, Chicago & Northwestern railroad bridges.

1650 Tons, Chicago, Illinois Bell Telephone Co., building.

1400 Tons, Des Moines, Iowa, newspaper building.

800 Tons, Norfolk, Va., power plant for Virginia Electric Power Co., Stone & Webster Engineering Corp., Boston.

780 Tons, South Norwalk, Conn., W. & J. Sloane Co., manufacturing building.

500 Tons, Portland, Me., state pier shed extensions, Fay, Spofford & Thorndike, Boston, engineers.

400 Tons, Norristown, Pa., Sacred Heart Hospital.

400 Tons, Hopkins, Minn., Red Owl stores.

365 Tons, Moorehead, Minn., warehouses.

300 Tons, Chicago, Peter Hand Brewing Co., building.

300 Tons, Columbus, Ohio, addition to the St. Clair engine house for Pennsylvania RR, bids due Mar. 28.

300 Tons, South Chicago, Ill., South Shore Arena skating rink.

295 Tons, Louise, Ariz., five gate frames, Davis Dam, Kingman, Ariz., Spec. 1161., Wm. C. Schmitt, Portland, low bidder.

200 Tons, Gretna, La., Southern Cotton Oil Co., factory.

200 Tons, Valparaiso, Ind., dormitories.

170 Tons, Chicago, Accurate Spring Mfg. Co., structure.

105 Tons, Sheboygan, Wis., Chicago & Northwestern railroad bridge.

• • • **Reinforcing bar** awards this week included the following:

2100 Tons, Massillon, Ohio, bridge superstructure for Pennsylvania RR, to Mt. Vernon Bridge Co., Mt. Vernon, Ohio.

1225 Tons, Cincinnati, flood wall, through McCarthy Improvement Co., contractor, to Carnegie-Illinois Steel Corp., Pittsburgh.

650 Tons, Akron, Ohio, O'Neil Co., to Carnegie-Illinois Steel Corp., Pittsburgh, through Hardware & Supply Co.

500 Tons, Indianapolis, Coca Cola bottling plant, to Hugh J. Baker, Indianapolis.

230 Tons, Chicago, addition to White Cap Co., to Ceco Steel Products Corp., Chicago.

120 Tons, Akron, Ohio, Polsky's Store, to Carnegie-Illinois Steel Corp., Pittsburgh, through Hardware & Supply Co., contractor.

• • • **Reinforcing bar** inquiries this week included the following:

2100 Tons, McAllister, Okla., U. S. Bureau of Yards and Docks.

468 Tons, Tucumcari, N. Mex., miscellaneous bars for Conchas and Hudson Canals, Bureau of Reclamation, Denver, bids under advisement.

350 Tons, Ottumwa, Iowa, reservoir; bids in on general contract.

300 Tons, Philadelphia, Philadelphia Inquirer building, substructure, bids due week of Mar. 18.

300 Tons, Louisville, Ky., Belknap Hardware & Mfg. Co., building.

250 Tons, Danville, Ill., Delco Div., General Motors Corp., building.

200 Tons, Madison, Wis., Forsberg Paper Box Co., building.

145 Tons, Elgin, Ill., state hospital power plant; W. E. O'Neill Construction Co., Chicago, low bidder on general contract.

122 Tons, Franklin, Ind., state highway work.

• • • **Sheet piling inquiries** this week included:

2900 Tons, Houghton, Mich., Keweenaw Waterway revetment; bids to U. S. Engineer, Duluth.

Distribution of Steel Topic of CPA Meeting

Washington

• • • **Highlighting the** meeting of the CPA Iron & Steel Advisory Committee on Mar. 27 will be a discussion of the mechanics for the distribution of steel products by means of the quota system and the use of preference ratings and CPA directives.

While not officially stated it is reliably reported that CPA will present a plan to the meeting whereby new users, unable to obtain minimum supplies of steel, will be taken care of by CPA mill directives. Reports that Henry Kaiser will bring his charges of discrimination before the meeting have served to bring such a plan to the forefront at CPA.

While some plan may be worked out to help new users it is doubtful whether this will be of any help to Mr. Kaiser, as it is reported that he would not be able to use any steel that may be allocated to him before December, due to the fact that his presses will not be delivered before that time. CPA will confront Mr. Kaiser with this information should he plead his case at the meeting. The agency has reportedly checked with the firm that is making the presses for the Kaiser-Frazer automobile plant.

CPA Administrator John D. Small says that Mr. Kaiser should be able to procure all the steel he needs on the open market when he is ready for automobile production.

In addition, the meeting will consider the possibility of an increase in overall production, as well as increased production of certain scarce items, such as electrical sheets, galvanized sheets, wire nails and other items in great demand because of the needs of the new national housing program.

Aluminum Plants for Sale

Washington

• • • **Four aluminum** reduction plants, representing a Federal Government investment of almost $73,000,000 are being placed on the market by the War Assets Corp.

The location of the plants, their costs and annual production capacities of aluminum are as follows:

	Thousands of Dollars	Millions of Lb
Riverbank, Calif.	$11,808	96
Torrance, Calif.	24,566	160
Troutdale, Ore.	18,718	128
Massena, N. Y.	20,383	96

WAC is also offering for sale or lease the $8,000,000 aluminum forging plant at Saginaw, Mich. The project was war-operated by General Motors Corp.

MACHINE TOOLS

. . . News and Market Activities

Survey Indicates Poor March Ordering

Cleveland

• • • **Machine tool order** volume is down and indications are that March business will fall about one-third below expectations, according to a preliminary survey of about 100 companies.

Shipments, the survey showed, are down about 15 pct, but it was pointed out that on the basis of the companies covered, there is the possibility that some of the larger companies may come in with a more favorable report, which in turn might change the overall picture.

By and large, machine tool builders are swamped with inquiries, but at the same time, cancellations, according to competent observers, are up. In addition, the strike situation, involving some of the Cincinnati builders, is unchanged, and on the West Coast, where lumber has been frozen, the builders at the moment have no lumber for crating. Help is expected soon in this quarter, however.

See pp. 102 103 *for additional machine tool news.*

Sources in the trade are generally agreed that three prime factors are pressuring the machine tool market into a somewhat depressed and queasy state. These are: OPA's ceiling prices, buyer discouragement over labor difficulties and unrest, and the government-owned machine tool surplus. In connection with this last, one of the industry's fondest observers has pointed out that some and perhaps many customers who cannot see their way clear to go ahead and buy new machines are buying from surplus now and will come around to the new equipment later. But just how soon they will get around to coming around is hard to tell.

At the present time, OPA has a very involved questionnaire they are asking the machine tool companies to fill out, so that OPA can study the question of price relief on an industry basis. This may be the first real move toward price relief.

However, one source pointed out that a company cannot be in a temporarily depressed condition and ask for relief; OPA will not consider temporary financial stringencies. But with the competition of the surplus and the problems of excess plant capacity, it does not seem that there will be anything too temporary about the industry's depressed condition, either mentally or financially.

Much talk regarding foreign business is being bandied about, but the general situation abroad does not reveal many possibilities, according to some sources in the trade, who do not feel that the industry will get much out of England, which in turn, got most of the French business. These sources report that the French would like to be self-sufficient on machine tools in a couple of years—an idea that is tied up with their present domestic economic plans.

While some past experience has indicated that the French prefer the machine tools from the industry here, they do have a source of supply just across the English channel where prices are something like 25 to 50 pct less than ours.

Russia, according to reports, has been building up a lot of machine tool facilities since 1936 and buying only real necessities in the standard general purpose line over and above precision equipment.

No definite answer as to the extent and composition of the government pool has been made as yet. The industry, of course, is watching this development with understandable curiosity, but the only information on it to date are strictly unofficial estimates.

Home Orders to Increase

Cincinnati

• • • **The machine tool market** in this district is quiet. Manufacturers report a modest flow of domestic orders which with the ending of the General Motors strike, is expected to increase materially. In fact, several builders have been indicating during the past month, that General Motors has a substantial additional retooling program awaiting the termination of the strike. This is particularly true of crankshaft lathes.

Foreign ordering is still fairly large and most plants indicate a substantial backlog from out of the country users.

Production, however, has been hampered materially by strikes since builders have been unable to obtain tool components. This is particularly true of electrical equipment and some plants have been forced to reduce production because of this inability to obtain necessary material.

Granted Process Right

Cleveland

• • • **National Malleable** & Steel Castings Co., reporting net profit for 1945 of $10,640, has secured United States rights to a new process for casting steel grinding balls and has formed a subsidiary, Rotary Steel Casting Co., which has purchased and is operating a small electric furnace foundry at Denver.

The company has also purchased from the government certain facilities at the Melrose Park, Ill., plant and is negotiating the purchase of other equipment installed at the Cicero, Ill., plant.

Although unprofitable operations while customers were reconverting reduced net profit for 1945 to $10,640, the company was able to add a total of $1,440,593 to surplus through credits of $533,988 for refund of 1943 and 1944 taxes by reason of unused 1945 excess profits credit, and of $895,964 through accelerated amortization of emergency facilities, it was said.

Capacity . . .

MARVEL 18 *for Size,* MARVEL 6A and 9A *for Volume Production*

WITH this battery of twelve No. 6A and No. 9A MARVEL High Speed Automatic Hack Saws, the Hammond & Irving Forge Co. of Albany, New York, can cut off billets automatically, not only in tremendous numbers, but in accurate weights and sizes to exactly fill each die without waste. With 12 of the "world's fastest cutting-off saws", they were able to keep all hammers running on their tremendous war orders, and were able to instantly resume peacetime manufacturing without re-tooling or other delay. The No. 6A and No. 9A MARVEL automatics have capacities of 6" x 6" and 10" x 10" respectively.

In addition to the battery of MARVEL Automatics, Hammond & Irving have cutting-off *capacity* of a different sort in their MARVEL No. 18 Hydraulic Hack Saw—capacity for size—because this roll-stroke giant cuts off billets and bars in sizes to 18" x 18" cross section. It easily handles the toughest and hardest steels.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U.S.A.

***Eastern Sales Office:* 225 Lafayette St., New York 12, N. Y.**

NONFERROUS METALS

. . . News and Market Activities

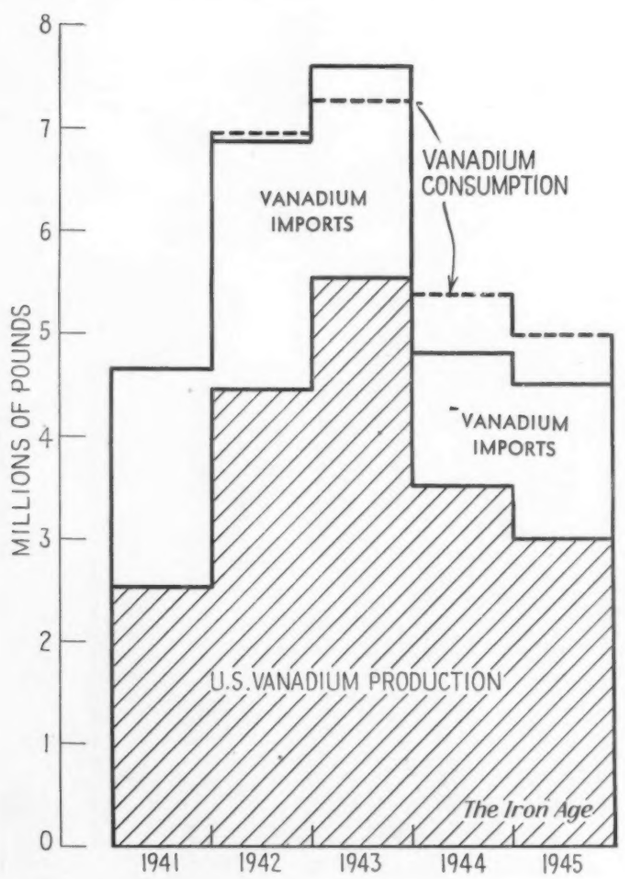
Survey Finds Brazil's Nickel Ores High Grade

New York

• • • **An area in Brazil** in the Mantiqueira district of the state of Goiaz has recently been surveyed by the the Mineral Production Service of the Ministry of Agriculture which reports 45 deposits containing large amounts of nickel bearing garnierite according to *O Jornal* of Rio de Janiero. Some of the deposits of the state have a metal content as high as 12 to 13 pct, although the average metal content of Goiaz nickel ores is about 5 pct, it has been reported by Jose Jobim.

According to W. T. Pecora in U. S. Geological Survey Bulletin 935-E, 1944, "The nickel silicate deposits near San Jose do Tocantins of Goiaz are the most promising nickel silicate deposits reported in the Western Hemisphere although most of the earlier published estimates of potential reserves appear too optimistic." In the opinion of Pecora, the ore reserves do warrant the establishment of a local nickel industry and he suggests that high grade ore could readily be selected for shipment and meanwhile additional development could outline new deposits of high grade ore. He suggests that surface mining of nickel silicate and cobalt "pebble" ore could be begun immediately by laborers using hand tools.

The American Smelting & Refining Co. has reported on the Tocantins nickel deposit, after having abandoned the project in 1944. According to the company's annual report for that year, the recovery of metal from the ores had presented a difficult metallurgical problem which has been solved by them. However, it was determined that the process would not permit of profit in Brazil.



SUPPLY AND DEMAND: *Vanadium ore and concentrates in millions of pounds of contained vanadium as reported by the U. S. Bureau of Mines. U. S. production statistics include ore received at mills and for government stockpile.*

Set Ceiling on High Grade Secondary Zinc

Washington

• • • **OPA has established** a base ceiling price of 9.25¢ per lb delivered at buyer's receiving point in carlots for secondary slab known as High Grade, effective Mar. 20. No ceiling prices for High Grade secondary slab zinc were provided when ceilings were originally established, OPA said, because at that time no High Grade secondary zinc was being produced.

High Grade secondary slab is secondary zinc with maximum impurities not exceeding the following: Lead, 0.07 pct; iron, 0.02 pct; cadmium, 0.07 pct; total impurities, not over 0.10 pct.

•

Revoke Nickel Controls

London

• • • **The British Ministry** of Supply has recently revoked the order made in 1941 which controlled the acquisition and disposal of nickel. Explaining the action, it was stated that world supplies are now adequate for all peacetime needs.

British consumers are now able to obtain nickel without application to the Directorate of Nonferrous Metals for license.

•

Tin Price Unsatisfactory

London

• • • **At least one** tin-producing firm here has already gone on record as being dissatisfied with the proposed new price for tin of $1200 per ton. Mr. O. V. G. Hoare, chairman of the Gold and Base Metals Mines of Nigeria, Ltd., indicated at a recent company meeting that if the price should be adopted for British government purchases, the firm's earning powers would suffer considerably.

He reiterated the demand that the British government should pay a price in conformity with the world markets, as long as the sale was compulsory for Empire producers.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb. contained Be	$30.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90-$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$103 to $105
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, New York, cents per oz.	70.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No.2)	10.00 to 10.50
Aluminum, deoxidizing No. 2, 3, 4	8.25 to 10.50
Brass ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c.

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 36c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ⅓ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ⅓ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 14c. per lb.; ⅓ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00[1]
Manganese bronze solids	6.00[2]
Manganese bronze borings	6.25[1]

OPA Group 4†

Refinery brass	4.50*

*Price varies with analysis, [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	9.50 to 10.00
Dural alloys, solids 14, 17, 18, 24S, 25S	6.00 to 6.50
turnings, dry basis	4.50 to 5.00
Low copper alloys 51, 52, 61, 63S solids	8.00 to 9.50
turnings, dry basis	7.00 to 8.50

Plant scrap, mixed

Solids	5.25
Turnings, dry basis	4.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	7.50
Old castings and forgings	6.00
Pistons, free of struts	5.00
Pistons, with struts	4.50
Old alloy sheet	5.50

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	3.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb.; 90 to 98% Ni, 23¢ per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18¾
Rolled, oval, straight	19¾
Curved	20¾
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23¾
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 pct plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80¾

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6083
Sodium cyanide, 96 pct, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 pct, crystals, bbls., frt. allowed	6.35

SCRAP

Market Tight; Slightly Easier on Coast

New York

• • • **This is the season** of the year when scrap is normally in best supply; this factor, together with continuing small offerings of termination and Naval surpluses on the eastern seaboard, has served to ease the scrap supply in that area. Meanwhile, however, the twin failures of industrial scrap to come out and the discarding of obsolescent machinery and equipment, continue to exert pressure on the resources of heavy steel production areas in which the ingot rate is fast approaching the postwar normal. Automotive scrap will not be coming out in volume, at least for another month or two, and railroad offerings are all but absent.

One of the basic factors tending to impair scrap recovery at this time, is a shortage in the ranks of collectors as compared with prewar and early wartime operations. There are those in the industry who consider that the easiest way to accelerate scrap receipts would be to improve returns to collectors by either price increases or other mechanisms. It is pointed out that a small increase in their economic position would induce many former collectors to go into the scrap business again and would serve to step up the aggressiveness of those now functioning.

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PITTSBURGH—The supply situation on scrap is getting progressively worse as time passes. There is some scrap moving by water into the Wheeling district, as usual, and the Eastern seaboard is becoming a greater source of scrap for this district than normally. Apparently, eastern yards, with their better preparation facilities, are becoming a greater factor here, shipping much of their prepared Navy material into this area. Government surplus scrap is not what might be expected at this time, having fallen off somewhat during the past two months. Some mills apparently are more in the market for low phos grades, willing to pay this premium for good scrap since No. 1 and No. 2 are very difficult to find.

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CHICAGO — Shipments to local mills are insufficient to maintain current operating rates and partial dependence must be placed on inventories of scrap, and in some cases pig iron, which were built up during the strike. Production scrap is coming out very slowly as manufacturers are restricting operations due to lack of steel. Remote scrap entering the district probably exceeds in tonnage local production scrap. The trade is watching with interest reopening of General Motors plants, said to have on hand substantial tonnages ready to be moved. Inquiries to the trade by consumers are heavy, but available material is spread thin in relation to potential orders.

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PHILADELPHIA — Scrap is reported to continue tight here but there is not quite so much demand as recently for unprepared scrap by yards to keep preparation machinery and labor active. Unprepared press scrap is apparently adequate but there is continuing need for shearing stock. Government offerings are not impressive this week but the Naval Ordnance plant at Washington is offering 3800 tons of unprepared scrap. The labor situation among yards is reported to continue somewhat better than a few months ago.

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DETROIT—Brokers and dealers here figure it will be from three to six weeks before the settlement of the General Motors strike begins to reflect itself in a flow of tonnage from the various factories. In the meantime, supply continues very tight in this market. Some sources feel there may be a mild lightening in the heavy demand which has manifested itself since last fall, although admittedly such determinations are extremely sketchy at this time.

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BUFFALO — Lack of quality is becoming more noticeable in tenders on current contracts as suppliers scrape bottom to make deliveries. High alloy content is one of the principal reasons for rejections averaging considerably above normal, and at least one steelmaker recently bought heavy railroad melting at the premium to help make up the deficiency. Leading dealers contend the shortage is largely a problem of distribution and, with profit margins dwindling, they are concerned over a rail conference to be held in Buffalo Apr. 17, when a proposal to hike the freight on scrap from the present 60 pct of the rate for new steel to 70 pct will be discussed.

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CLEVELAND—With the market quiet and all prices firm at ceiling, the scrap situation here continues practically unchanged. Most mills are staying away from low phos and paying $1.50 springboards on other grades, including turnings, and are still in a comfortable inventory position. Production scrap has picked up a little bit since last week, but some consumers are counting on boat scrap to help them out. Shipments should start around the latter part of April, at the latest, although on an open day the run from Detroit could be made right now. Shipment from Muskegon and Milwaukee have to go through the Soo and will probably not be a factor until later on.

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BOSTON — Cast and low phos are coming out a little more freely, but foundries are still hard put for supplies. Steel mill scrap shipments are not equal to demand. Springboard prices, a disregard of scheduled cutting lengths of certain material and premiums paid for scrap are subterfuges reported by the trade. The freight car supply situation is not much better. Surplus machine tools usually are too costly to scrap, but some surplus road machinery is being prepared.

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ST. LOUIS—Although the movement of scrap to the district mills has improved, the supply is still tight. One reason being the absence of "peddlers" with trucks in the country and cities, other causes the lack of industrial scrap. The improvement is due to the movement from dealers' yards here and more railroad offerings, the latest lists being Missouri-Kansas-Texas, four cars: Louisville & Nashville, 3900 tons and St. Louis-San Francisco, 1500 tons. An ordnance offering of 6100 tons of shells is also pending.

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TORONTO — Improvement in weather conditions throughout eastern Canada has had a stimulating effect on supplies here, but has not been sufficient for all requirements. Scrap deliveries from rural districts have been resumed in a small way. With industrial operation picking up, larger quantities are also appearing from this source. Demand, however, has been expanding and steel mills continue to tap every source of supply. Some steel mills have purchased from War Assets Corp. ships built for war use, but it is stated that the wrecking of these craft does not make economical scrap.

Frank Parker Dies

Chicago

• • • **Frank Parker, 56, founder and chairman of the board of Iron & Steel Products, Inc., Chicago, dealer in used machinery, railroad equipment, and iron and steel scrap, died Sunday, following a cerebral hemorrhage suffered last Wednesday. Mr. Parker was founder of the firm in 1930 and served as president until 1943 when he became chairman of the board. A former national vice-president of the Institute of Scrap Iron & Steel, Inc., he served two terms as president of the Chicago chapter.**

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Angles & splice bars	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
Rails 3 ft. and under	22.25*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Store plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.00 to 15.75
No. 1 hvy. melting	15.00 to 15.75
No. 2 hvy. melting	14.00 to 14.75
No. 2 bales	13.00 to 13.75
No. 3 bales	7.50 to 8.25
Mach. shop turn.	6.50 to 7.25
Elec. furn. 1 ft. und.	15.00 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to $15.25
No. 2 hvy. melting	13.50 to 14.25
No. 1 bales	13.50 to 14.25
No. 2 bales	12.50 to 13.25
No. 3 bales	8.00 to 9.00
Mach. shop turn.	6.00
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$12.50
No. 1 & No. 2 hvy. melting	12.50
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast.	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

[Advances over past week in **Heavy Type**; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.]

Flat-Rolled Steel: (cents per pound)	Mar. 19, 1946	Mar. 12, 1946	Feb. 12, 1946	Mar. 20, 1945
Hot-rolled sheets	2.425	2.425	2.20	2.20
Cold-rolled sheets	3.275	3.275	3.05	3.05
Galvanized sheets (24 ga.)	4.05	4.05	3.70	3.65
Hot-rolled strip				
6 in. and under	2.45	2.45	2.10	2.10
Over 6 in.	2.35	2.35	2.10	2.10
Cold-rolled strip	3.05	3.05	2.80	2.80
Plates	2.50	2.50	2.25	2.20
Plates, wrought iron	4.112	4.112	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.25	$5.25	$5.00	$5.00
Tinplate, electro (0.50 lb)	4.75	4.75	4.50	4.50
Special coated mfg. ternes	4.55	4.55	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.50	2.50	2.25	2.15
Cold-finished bars	3.10	3.10	2.75	2.65
Alloy bars	2.808	2.808	2.70	2.70
Structural shapes	2.35	2.35	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.76	4.76	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.05	3.05	2.75	2.60
Wire nails	3.25	3.25	2.90	2.80
Rails: (dollars per net ton)				
Heavy rails	$43.39	$43.39	$43.00	$43.00
Light rails	49.18	49.18	45.00	43.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$39.00	$39.00	$36.00	$34.00
Sheet bars	38.00	38.00	36.00	34.00
Slabs, rerolling	39.00	39.00	36.00	34.00
Forging billets	47.00	47.00	42.00	40.00
Alloy blooms, billets, slabs	56.16	56.16	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.30	2.30	2.15	2.00
Skelp	2.05	2.05	1.90	1.90

Pig Iron: (per gross ton)	Mar. 19, 1946	Mar. 12, 1946	Feb. 12, 1946	Mar. 20, 1945
No. 2 foundry, Phila.	$28.34	$27.59	$27.59	$26.84
No. 2, Valley furnace	26.50	25.75	25.75	25.00
No. 2, Southern, Cin'ti	26.94	26.19	26.19	25.44
No. 2, Birmingham	22.88	22.13	22.13	21.38
No. 2 foundry, Chicago†	26.50	25.75	25.75	25.00
Basic, del'd eastern Pa.	27.84	27.09	27.09	26.34
Basic, Valley furnace	26.00	25.25	25.25	24.50
Malleable, Chicago†	26.50	25.75	25.75	25.00
Malleable, Valley	26.50	25.75	25.75	25.00
L. S. charcoal, Chicago	42.34	42.34	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Note: Increased steel prices announced Mar. 1 are retroactive to Feb. 15.

Composite Prices . .

[Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.]

	FINISHED STEEL	PIG IRON	SCRAP STEEL
March 19, 1946	2.69516¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One week ago	2.69516¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One month ago	2.44104¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One year ago	2.38444¢ per lb.	$24.61 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH			FINISHED STEEL LOW			PIG IRON HIGH		PIG IRON LOW		SCRAP STEEL HIGH		SCRAP STEEL LOW	
1946	2.69516¢	Feb.	19	2.44104¢	Jan.	1	$26.12	Mar. 19	$25.37		$19.17		$19.17	
1945	2.44104¢	Oct.	2	2.38444¢	Jan.	2	25.37	Oct. 23	$23.61	Jan. 2	$19.17	Jan. 2	$18.92	May 22
1944	2.30837¢	Sept.	5	2.21189¢	Oct.	5	$23.61		$23.61		$19.17		15.76	Oct. 24
1943	2.29176¢			2.29176¢			23.61		23.61		19.17		$19.17	
1942	2.28249¢			2.28249¢			23.61		23.61		19.17		19.17	
1941	2.43078¢			2.43078¢			$23.61	Mar. 20	$23.45	Jan. 2	$22.00	Jan. 7	$19.17	Apr. 10
1940	2.30467¢	Jan.	2	2.24107¢	Apr.	16	23.45	Dec. 23	22.61	Jan. 2	21.83	Dec. 30	16.04	Apr. 9
1939	2.35367¢	Jan.	3	2.26689¢	May	16	22.61	Sept. 19	20.61	Sept. 12	22.50	Oct. 3	14.08	May 16
1938	2.58414¢	Jan.	4	2.27207¢	Oct.	18	23.25	June 21	19.61	July 6	15.00	Nov. 22	11.00	June 7
1937	2.58414¢	Mar.	9	2.32263¢	Jan.	4	23.25	Mar. 9	20.25	Feb. 16	21.92	Mar. 30	12.67	June 9
1936	2.32263¢	Dec.	28	2.05200¢	Mar.	10	19.74	Nov. 24	18.73	Aug. 11	17.75	Dec. 21	12.67	June 8
1935	2.07642¢	Oct.	1	2.06492¢	Jan.	8	18.84	Nov. 5	17.83	May 14	13.42	Dec. 10	10.33	Apr. 29
1934	2.15367¢	Apr.	24	1.95757¢	Jan.	2	17.90	May 1	16.90	Jan. 27	13.00	Mar. 13	9.50	Sept. 25
1933	1.95578¢	Oct.	3	1.75836¢	May	2	16.90	Dec. 5	13.56	Jan. 3	12.25	Aug. 8	6.75	Jan. 3
1932	1.89196¢	July	5	1.83901¢	Mar.	1	14.81	Jan. 5	13.56	Dec. 6	8.50	Jan. 12	6.43	July 5
1931	1.99626¢	Jan.	13	1.86586¢	Dec.	29	15.90	Jan. 6	14.79	Dec. 15	11.33	Jan. 6	8.50	Dec. 29
1930	2.25488¢	Jan.	7	1.97319¢	Dec.	9	18.21	Jan. 7	15.90	Dec. 16	15.00	Feb. 18	11.25	Dec. 9
1929	2.31773¢	May	28	2.26498¢	Oct.	29	18.71	May 14	18.21	Dec. 17	17.58	Jan. 29	14.08	Dec. 3

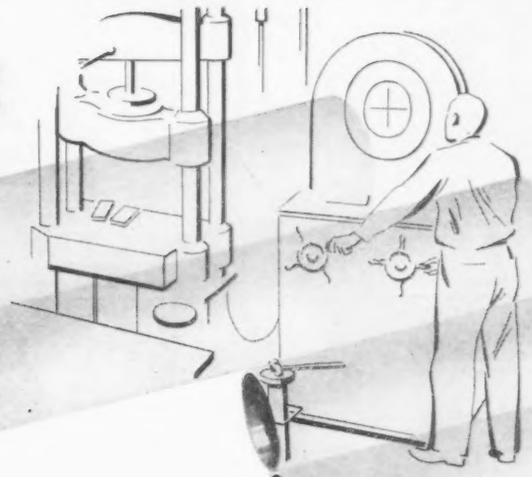
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Scientific SAFEGUARDS

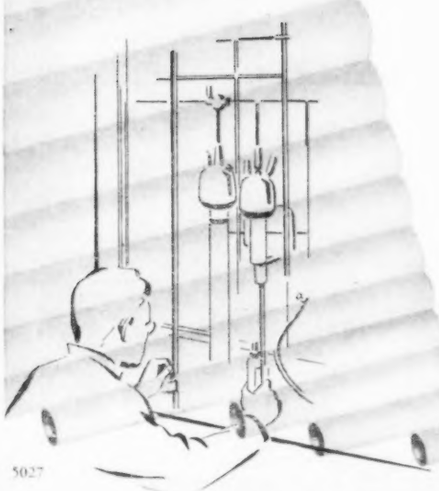
. . . to assure uniformity and quality in steel tubes



GLOBE TUBES

Extra care in production control assures uniformity and quality in all classes of Globe steel tubes. Unvarying quality is safeguarded and production methods and materials exactly controlled by one of the largest and complete chemical and physical laboratories of its kind, concentrating on tubing characteristics and problems.

You can be sure of uniformity and quality when you specify Globe tubes — pressure, mechanical, or stainless.



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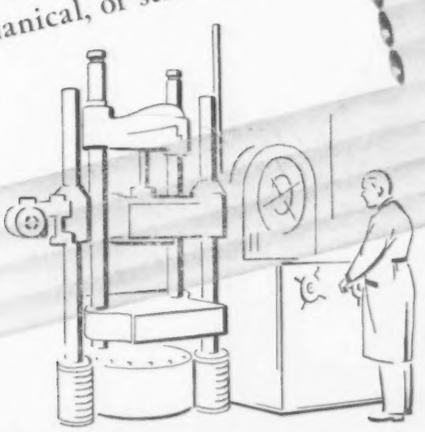


GLOBE STEEL TUBES CO.

Milwaukee 4, Wisconsin, U. S. A.

★ PRESSURE TUBES ★ CONDENSER & HEAT EXCHANGER TUBES ★ GLOBEIRON HIGH PURITY IRON SEAMLESS TUBES
★ MECHANICAL TUBING ★ GLOWELD WELDED STAINLESS STEEL TUBES ★ SEAMLESS STAINLESS STEEL TUBES

Iron and Steel Prices...

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS															
Carbon, rerolling	($33.00 f. o. b. mill)														
Carbon, forging	$38	$38	$38	$38	$38	$38	$38								
Alloy	$46.80	$46.80				$46.80	(Bethlehem, Massillon, Canton, Coatesville=$46.80)								
BILLETS, BLOOMS, SLABS						(Provo=$50.20, Duluth=$41[14])									
Carbon, rerolling	$39	$39	$39	$39	$39	$39	$39	$39				$51[14]	$41		
Carbon, forging billets	$47	$47	$47	$47	$47	(Provo=$58.20, Duluth=$49[14]) $47	$47					$59[14]	$49		
Alloy	$56.16	$56.16				$56.16	(Bethlehem, Massillon, Canton=$56.16)						$61		
SHEET BARS	$38	$38		$38		$38	$38	$38	(Canton=$38)						
PIPE SKELP	2.05¢	2.05¢					2.05¢	2.05¢	(Coatesville=2.05¢)						
WIRE RODS [15]															
No. 5 to 9/32 in.	2.30¢	2.30¢		2.30¢	2.30¢	(Worcester=2.40¢)					2.55¢	2.80¢			
SHEETS															
Hot-rolled	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.525¢	2.425¢		2.975¢	2.525¢	2.665¢	2.595¢
Cold-rolled [1]	3.275¢	3.275¢	3.275¢	3.275¢		3.275¢	3.275¢		3.375¢	3.275¢		3.925¢	3.375¢	3.615¢	3.595¢
Galvanized (24 gage)	4.05¢	4.05¢	4.05¢		4.05¢	4.05¢	4.05¢	4.05¢	4.15¢	4.05¢		4.60¢		4.29¢	4.22¢
Enameling (20 gage)	3.80¢	3.80¢	3.80¢	3.80¢			3.80¢		3.90¢	3.80¢		4.45¢	3.90¢	4.16¢	4.12¢
Long ternes [2]	4.05¢	4.05¢	4.05¢									4.80¢		4.41¢	4.37¢
STRIP															
Hot-rolled [3] 6 in. and under	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢		2.45¢			2.45¢		3.10¢	2.55¢	2.81¢	2.77¢
Hot-rolled [3] over 6 in.	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢		2.35¢			2.35¢		3.00¢	2.45¢	2.71¢	2.67¢
Cold-rolled [4]	3.05¢	3.15¢		3.05¢			3.05¢	(Worcester=3.25¢)					3.15¢	3.41¢	3.37¢
Cooperage stock	2.55¢	2.55¢			2.55¢		2.55¢							2.91¢	
Commodity cold-rolled	3.20¢	3.30¢		3.20¢			3.20¢	(Worcester=3.60¢)					3.30¢	3.56¢	
TINPLATE															
Standard cokes, base box	$5.25	$5.25	$5.25		$5.35			$5.35	$5.35					$5.60[11]	$5.53[11]
Electro, box 0.25 lb	$4.60	$4.60	$4.60					$4.70							
Electro, box 0.50 lb	$4.75	$4.75	$4.75					$4.85	$4.85						
Electro, box 0.75 lb	$4.90		$4.90					$5.00	$5.00						
BLACKPLATE															
29 gage [5]	3.30¢	3.30¢	3.30¢					3.40¢	3.40¢			4.30¢			3.57¢
TERNES, MFG.															
Special coated, base box	$4.55	$4.55	$4.55					$4.65	$4.65						
BARS															
Carbon steel	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	(Duluth=2.60¢) (Provo, Utah=3.20¢)			2.85¢	3.15¢	2.60¢	2.84¢	2.82¢
Rail steel [6]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢					2.85¢	3.15¢			
Reinforcing (billet) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢			2.70¢	2.75¢	2.45¢	2.59¢	2.67¢
Reinforcing (rail) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢				2.70¢	2.75¢	2.45¢		2.57¢
Cold-finished [8]	3.10¢	3.10¢	3.10¢	3.10¢		3.10¢	(Detroit=3.15¢) (Toledo=3.25¢)							3.44¢	3.42¢
Alloy, hot-rolled	2.808¢	2.808¢				2.808¢	2.808¢	(Bethlehem Massillon, Canton=2.808¢)					2.908¢		
Alloy, cold-drawn	3.484¢	3.484¢	3.484¢	3.484¢		3.484¢							3.584¢		
PLATE								(Coatesville and Claymont=2.50¢, Provo, Utah=3.20¢)							
Carbon steel [13]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢			2.85¢	3.05¢	2.72¢	2.69¢	2.55¢
Floor plates	3.75¢	3.75¢									4.10¢	4.40¢		4.11¢	4.07¢
Alloy	3.64¢	3.64¢			(Coatesville=3.64¢)						4.108¢	4.316¢		3.64¢	3.73¢
SHAPES															
Structural	2.35¢	2.35¢	2.35¢		2.35¢	2.35¢	(Bethlehem=2.35¢)				2.60¢	3.00¢		2.52¢	2.465¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	3.05¢			3.05¢			(Worcester=3.25¢)								
0.51 to 0.75 carbon	4.55¢			4.55¢			(Worcester=4.75¢)								
0.76 to 1.00 carbon	6.40¢			6.40¢			(Worcester=6.60¢)								
1.01 to 1.25 carbon	8.60¢			8.60¢			(Worcester=8.80¢)								
WIRE [9]															
Bright [12]	3.05¢	3.05¢		3.05¢	3.05¢		(Worcester=3.15¢) (Duluth=3.10¢)					3.55¢			3.37¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	3.65¢	3.65¢		3.65¢			(Worcester=3.75¢)					4.15¢			3.97¢
PILING															
Steel sheet	2.65¢	2.65¢				2.65¢						3.20¢			2.97¢

CORROSION AND HEAT RESISTANT STEELS

in cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	21.25	20.40	15.725	16.15	19.125	23.375
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	21.25	20.40	15.725	16.15	19.125	23.375
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	25.00	24.00	18.50	19.00	22.50	27.50
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft Wayne, Watervliet	25.00	24.00	18.50	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	29.00	27.00	21.50	22.00	26.50	30.50
Shapes, structural, P'gh, Chi	25.00	24.00	18.50	19.00	22.50	27.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	36.00	34.00	26.50	29.00	32.50	36.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	23.50	21.50	17.00	17.50	24.00	35.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	30.00	28.00	22.00	22.50	32.00	52.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila	25.00	24.00	18.50	19.00	22.50	27.50
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	30.00	28.00	22.00	22.50	32.00	52.00
Rod, h-r, Newark, N. J., Syracuse	25.00	24.00	18.50	19.00	22.50	27.50
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	66.63	66.63	.....	63.30	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., net ton	$43.40
Angle splice bars, 100 lb	2.85
(F.o.b. basing points)	*per net ton*
Light rails (from billets)	$49.18
Light rails (from rail steel)	48.29
	base per lb
Cut spikes	3.65¢
Screw spikes	5.55¢
Tie plate, steel	2.55¢
Tie plates, Pacific Coast	2.70¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk)

(*Also Canton, O.)	*base per lb*
High speed	72.5¢
Straight molybdenum	58.4¢
Tungsten-molybdenum	62.2¢
High-carbon-chromium*	46.5¢
Oil hardening*	26.0¢
Special carbon*	23.8¢
Extra carbon*	19.5¢
Regular carbon*	15.2¢

Warehouse prices east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	*Sheet*
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	18.00*	19.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.00	....
Inconel-clad		
10 pct, f.o.b. Coatesville	25.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	base per keg	
Standard wire nails	$3.25	$3.75
Coated nails	3.25	3.75
Cut nails, carloads	3.55	....
	base per 100 lb	
Annealed fence wire	$3.50	$4.00
Annealed galv. fence wire	3.85	4.35
	base column	
Woven wire fence*	72	90
Fence posts, carloads	74	91
Single loop bale ties††	72	97
Galvanized barbed wire**	79	89
Twisted barbless wire	79	89

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

††Add 50¢ a ton.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$8.50	$17.00
15-lb coating I.C.	9.50	19.00
20-lb coating I.C.	10.00	20.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms and Slabs	Bars and Bar-strip	Billets, Blooms and Slabs
NE 8600	0.676¢	$13.52	1.196¢	$23.92
NE 8700	0.728	14.56	1.248	24.96
NE 9400	0.780	15.60	1.300	26.00
NE 9700	0.676	13.52	1.196	23.92
NE 9800	1.352	27.04	1.872	37.44
NE 9900	1.248	24.96	1.612	32.24

The extras shown are in addition to the base price of $2.808 per 100 lb on finished products and $56.16 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.26¢ per lb for bars and bar-strip and $5.20 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
⅛-in.	60½	48
¼-in.	63½	52
1-in. to 3-in.	65½	54½

Wrought Iron (buttweld)

⅛-in.	18	+4
¼-in.	24	2½
1-in. and 1¼-in.	28½	9
1½-in.	33	12
2-in.	32	11

Steel (lapweld)

2-in.	58	46½
2½-in. and 3-in.	61	49½
3½-in. to 6-in.	63	51½

Wrought Iron (lapweld)

2-in.	25	4½
2½-in. to 3½-in.	26	7
4-in.	28	11
4½-in. to 8-in.	27	10

Steel (butt, extra strong, plain ends)

⅛-in.	58½	47½
¼-in.	62½	51½
1-in. to 3-in.	64	54

Wrought Iron (same as above)

⅛-in.	19	+1½
¼-in.	25	4½
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

2-in.	56	45½
2½-in. and 3-in.	60	49½
3½-in. to 6-in.	63½	53

Wrought Iron (same as above)

2-in.	28	8½
2½-in. to 4-in.	34	16
4½-in. to 6-in.	32	14½

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	16.52	13.90	13.20
2½ in. O.D. 12 B.W.G.	22.21	18.70	17.67
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56
3½ in. O.D. 11 B.W.G.	31.18	26.25	24.68
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55

(Extras for less carload quantities)

40,000 lb or ft and over.....Base
30,000 lb or ft to 39,999 lb or ft.... 5 pct
20,000 lb or ft to 29,999 lb or ft....10 pct
10,000 lb or ft to 19,999 lb or ft....20 pct
5,000 lb or ft to 9,999 lb or ft....30 pct
2,000 lb or ft or 4,999 lb or ft....45 pct
Under 2,000 lb or ft.....65 pct

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago....$60.80
6-in. and larger, del'd New York... 60.20
6-in. and larger, Birmingham..... 52.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle 74.00

For all rail shipment; rail and water shipment less.

Class "A" and gas pipe, $3 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

Percent Off List

½ in. & smaller x 6 in. & shorter....65½
9/16 & ⅝ in. x 6 in. & shorter.....63½
¾ to 1 in. x 6 in. & shorter.....61
1⅛ in. and larger, all lengths.....59
All diameters over 6 in. long.....59
Lag, all sizes.....62
Plow bolts.....65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller.....62
9/16 to 1 in. inclusive.....59
1⅛ to 1½ in. inclusive.....57
1⅝ in. and larger.....56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts

Consumer

Packages, nuts loose.....71 and 10
In packages.....71
In bulk.....80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham..... $3.75

Small Rivets

(7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....65 and 5

Cap and Set Screws	*Consumer Percent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh.....21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh.....20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe.....12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots..... 4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots..... 63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe 30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe..... 42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe..... 90¢
Aluminum, 100 and 200 mesh..... *25¢
Antimony, 100 mesh..... 30¢
Cadmium, 100 mesh..... $1.40
Chromium, 100 mesh and finer.... $1.25
Lead, 100, 200 & 300 mesh....11½ to 15¢
Manganese..... 65¢
Nickel, 150 mesh..... 51½¢
Solder powder, 100 mesh..8½¢ plus metal
Tin, 100 mesh..... 58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb..... $2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb... $2.60
Under 100 lb..... $3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	13.75†
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $14.25 in the St. Louis, Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-Duty brick, St. Louis	$68.50
First quality, Pa., Md., Ky., Mo., Ill.	54.40
First quality, New Jersey	59.35
Sec. quality, Pa., Md., Ky., Mo., Ill.	49.35
Sec. quality, New Jersey	51.95
No. 1 Ohio	45.60
Ground fire clay, net ton	8.05
Silica Brick	
Pennsylvania and Birmingham	$54.40
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55
Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

Per Gross Ton

Old range, bessemer, 51.50..... $4.95
Old range, non-bessemer, 51.50.... 4.80
Mesaba, bessemer, 51.50..... 4.70
Mesaba, non-bessemer, 51.50..... 4.55
High phosphorus, 51.50..... 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

WAREHOUSE PRICES*

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872[5]	$4.868a	$3.922	$4.772	$3.605	$3.666	$3.822	$4.172	$5.818	$6.866	$7.072	$8.172
New York	3.59	4.613	5.210	3.974[6]	4.772	3.768	3.758	3.853	4.203	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.324[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.994	3.902	4.752	3.594	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.471	4.165	4.865	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.331	3.60	4.65[17]	3.55	3.55	3.50	3.85	5.80	6.65	6.65	7.75
Milwaukee	3.387	4.337	5.372	3.737	4.787[17]	3.687	3.887	3.637	3.987	5.837	6.887	6.887	8.137
Cleveland	3.35	4.40	4.977	3.60	4.45[17]	3 40	3.588	3.35	3.85	5.806	6.856	6.65	7.75
Buffalo	3.35	4.40	4.85	3.819	4.669	3.63	3 40	3.35	3.85	5.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.10	3.70	4.659[17]	3 609	3.661	3.45	3.90	5.93	6.98	6.959	8.059
Cincinnati	3.425	4.475	4.925[5]	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St Louis	3.397	4.347	5.231	3.747	4.931[17]	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.85	3.60	4.45	3.40	3.40	3 35	3.85	5.60	6.65	6.65	7.75
St. Paul	3.50	4.46	5.357	3.86	5.102[17]	3.81[13]	3.811[3]	3.76[13]	3.461	5.94	5.99	7.361	8.461
Omaha	3.865	5.443	5.615	4.143	....	4.093	4 093	4.043	4.543	....	....	....	....
Indianapolis	3.52	4.568	5.018	3.768	4.741	3.63	3.63	3.58	4.08	5.93	6.98	6.98	8.23
Birmingham	3.45	....	4.85	3.70	....	3.55	3.55	3.65	4.53	....	....	....	....
Memphis	3.965	4.78	6.365	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.079	5.458	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.413[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20	6.20	4.95	5.813[15]	4.95	4.65	4.40	5.683	8.204	9.404	9.304	10.454
San Francisco	4.55[14]	7.30[4]	6.45	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.433	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	6.05	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.85	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.27[13]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

* Until new detailed warehouse prices are reported by distributors, no change will be made in the prices above. However, OPA says recent steel price adjustments may be added to the prices quoted here.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-FINISHED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

GALVANIZED: 450 to 1499 lb.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, effective Mar. 15, 1946.
Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	27.00	27.50	28.00	28.50	....
Birdsboro	27.00	27.50	28.00	28.50	32.00
Birmingham	21.50	22.88	....	27.50	....
Buffalo	25.50	26.50	27.00	27.50	32.00
Chicago	26.00	26.50	26.50	27.00	....
Cleveland	26.00	26.50	26.50	27.00	....
Detroit	26.00	26.50	26.50	27.00	....
Duluth	26.50	27.00	27.00	27.50	....
Erie	26.00	26.50	27.00	27.50	....
Everett	27.00	27.50	28.00	28.50	....
Granite City	26.00	26.50	26.50	27.00	....
Hamilton	26.00	26.50	26.50	....	....
Neville Island	26.00	26.50	26.50	27.00	....
Provo	24.00	24.50	....	....	....
Sharpsville[1]	26.00	26.50	26.50	27.00	....
Sparrows Point	27.00	27.50	.....	.....	....
Steelton	26.25	....	....	....	32.00
Swedeland	27.00	27.50	28.00	28.50	....
Toledo	26.00	26.50	26.50	27.00	....
Youngstown	26.00	26.50	26.50	27.00	....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	0.50	27.50	28.00	28.50	29.00	....
Boston	Birdsboro-Steelton	4.02	....	....	....	....	36.02
Brooklyn	Bethlehem	2.50	29.50	30.00	30.50	31.00	....
Brooklyn	Birdsboro	2.92	....	....	....	....	34.92
Canton	Clev, Ygstn, Sharpsvil.	1.39	27.39	27.89	27.89	28.39	....
Canton	Buffalo	3.19	....	....	....	....	35.19
Cincinnati	Birmingham	4.06	25.56	26.94	....	....	....
Cincinnati	Hamilton	1.11	.....	.....	27.61	.....	....
Cincinnati	Buffalo	4.40	....	....	....	....	36.40
Jersey City	Bethlehem	1.53	28.53	29.03	29.53	30.03	.....
Jersey City	Birdsboro	1.94	....	....	....	....	33.94
Los Angeles	Provo	4.95	28.95	29.45	.....	.....	....
Los Angeles	Buffalo	15.41	....	....	....	....	47.43
Mansfield	Cleveland-Toledo	1.94	27.94	28.44	28.44	28.94	.....
Mansfield	Buffalo	3.36	....	....	....	....	35.36
Philadelphia	Swedeland	0.84	27.84	28.34	28.84	29.34	....
Philadelphia	Birdsboro	1.24	....	....	....	....	33.24
San Francisco	Provo	4.95	28.95	29.45	.....	.....	....
San Francisco	Buffalo	15.41	....	....	....	....	47.41
Seattle	Provo	4.95	28.95	29.45	.....	.....	.....
Seattle	Buffalo	15.41	....	....	....	....	47.41
St. Louis	Granite City	0.50	26.50	27.00	27.00	27.50	....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	39.07

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ per ton in excess of **basing point prices for No. 2 foundry, basic, bessemer and malleable.**

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorous content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$32.00; f.o.b. Buffalo—$33.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots	6.80¢	7.80¢	8.80¢

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point, freight allowed.

96-98% Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30¢
L.c.l. lots	32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	34¢
Ton lots	36¢
Less ton lots	38¢

Low-Carbon Ferromanganese

Contract price per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% C, 0.06% P, 90% Mn	23.00¢	23.40¢	23.65¢
0.10% max. C, 1% or 2% max. Si	23.00¢	23.40¢	23.65¢
0.15% max. C, 1% or 2% max. Si	22.00¢	22.40¢	22.65¢
0.30% max. C, 1% or 2% max. Si	21.00¢	21.40¢	21.65¢
0.50% max. C, 1% or 2% max. Si	20.00¢	20.40¢	20.65¢
0.75% max. C, 7.00% max. Si	16.00¢	16.40¢	16.65¢

Silicomanganese

Contract basis, lump size, per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
Ton lots	6.70¢
Briquet, contract basis, carlots, bulk, freight allowed, per lb. of briquet	5.80¢
Ton lots	6.30¢
Less ton lots	6.55¢

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $48.75 f.o.b. Keokuk, Iowa; $46.75 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

Contract price per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots, packed.

	Eastern	Central	Western
96% Si, 2% Fe	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

Contract price per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination. 40% Si.

	Eastern	Central	Western
Carload, bulk	3.35¢	3.50¢	3.65¢
Ton lots	3.80¢	4.20¢	4.25¢

Electric Ferrosilicon

Contract price per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.25¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Ferrochrome (65-72% *Cr*, 2% *max. Si*)

Contract prices per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	20.50¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

Briquets—contract price per pound of briquet, f.o.b. shipping point, freight allowed. 60% chromium.

	Eastern	Central	Western
Carload, bulk	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots	9.00¢	9.50¢	11.00¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	14.00	14.40	15.00
Ton lots	14.90	15.55	16.75
Less ton lots	15.40	16.05	17.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25 max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices per pound, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot	45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots	17.00¢	17.85¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.35	$1.75	$4.25
Less ton lots	1.60	2.00	5.00

CMSZ

Contract price per pound of alloy, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.			
Ton lots	12.00¢	12.75¢	14.75¢
Less ton lots	12.50¢	13.25¢	15.25¢
Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.			
Ton lots	11.75¢	12.50¢	14.50¢
Less ton lots	12.25¢	13.00¢	15.00¢

SMZ

Contract price per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00¢	12.85¢	14.60¢
Less ton lots	12.50¢	13.35¢	15.10¢

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45¢, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	14¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	5.75¢
Ton lots	7.25¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound.	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	25¢
Ton lots	26¢
Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	58¢
Ton lots	59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.25
Less ton lots	$2.30

Amputees Given Proof Of Their Adaptability To Material Handling

Chicago

• • • **War veterans who lost arms** in combat received personal introduction to an industrial field—that of material handling—in which they can find jobs and opportunity for advancement when Automatic Transportation Co., Chicago material handling equipment manufacturer, demonstrated its equipment to patients at the Thomas W. England General Hospital, Atlantic City, N. J.

Knowing that material handling is a field which offers amputees jobs which they can perform as effectively as a person without any disability, Automatic planned the demonstration as a means of showing disabled veterans who worked in industrial plants before the war and those who desire to do so now that despite their disability they can find and perform real jobs in industry and to give a representative group of amputees a chance to try out the Automatic equipment.

The demonstration centered around the Transporter, Automatic electric propelled hand truck which will handle a 6000-lb load with finger-tip control. After brief directions from Automatic representatives, the men operated the equipment themselves.

The Transporter is so constructed that even a person without any disability uses only one hand in operating it. Forward and reverse movement is controlled by two thumb buttons on the handle, and speed is regulated by the vertical angle of the handle itself. The brake is applied automatically when the handle is released. A one-armed man can thus handle even the heaviest loads with facility and safety.

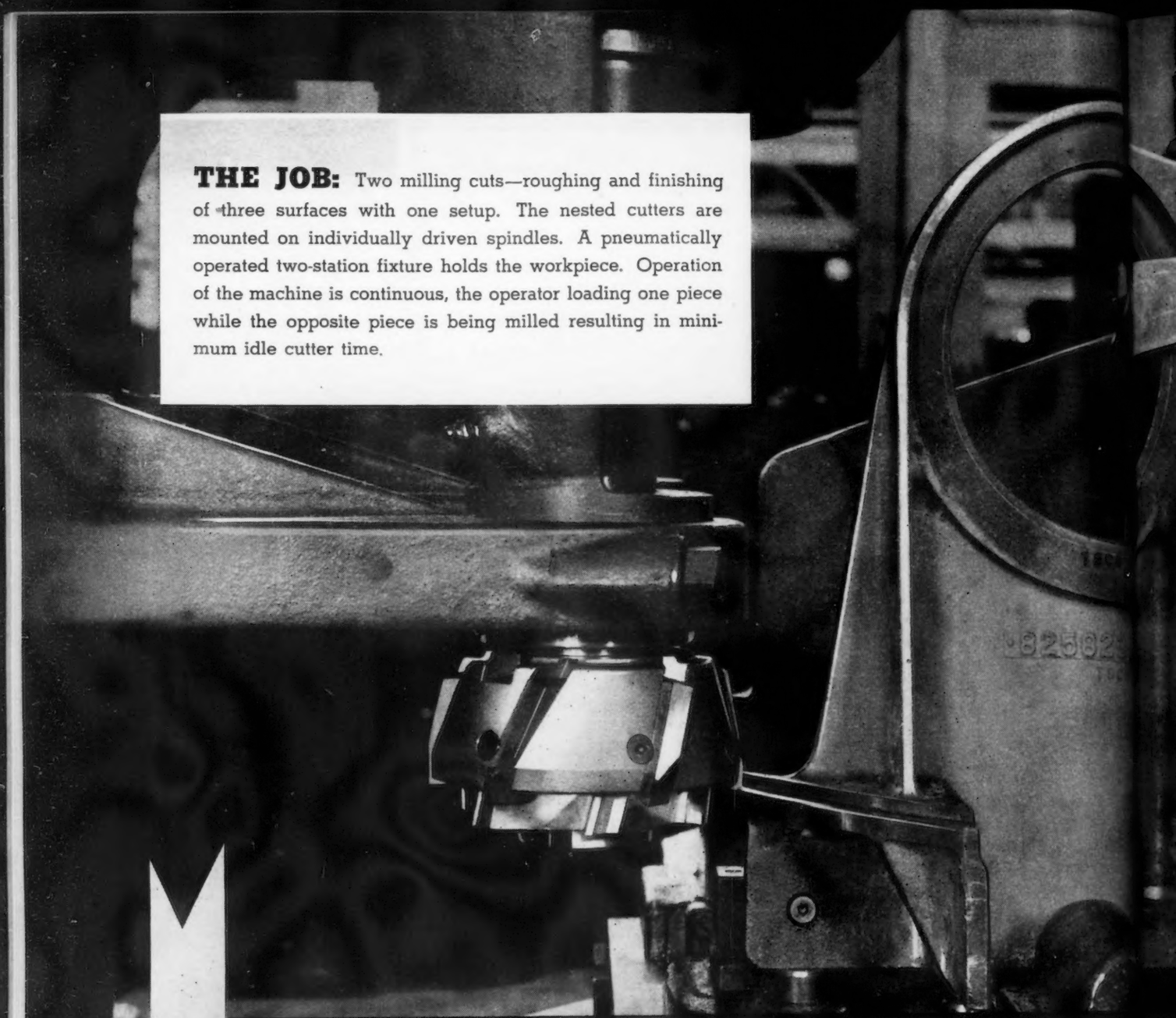
The demonstration was directed by Robert M. Whitney, Automatic official in charge of the firm's exhibit at the conventions. Whitney told the hospital patients that many industrial firms are now needing men to fill positions in their material handling programs and that many of those firms desire to hire amputees, since material handling with electric propelled equipment is one of the few jobs which men thus disabled can perform effectively.

Honeywell Earnings Up

Minneapolis

• • • **Minneapolis-Honeywell Regulator Co.** reported net earnings of $3,436,637 for 1945, after providing $8,347,000 for taxes on income. Net sales for the year were $84,392,427.

CAN DO: *A group of one-armed veterans demonstrate their ability to perform service in the material handling field by operating Automatic Transportation Co.'s platform model Transporter, 3000-lb capacity electric hand truck.*



THE JOB: Two milling cuts—roughing and finishing of three surfaces with one setup. The nested cutters are mounted on individually driven spindles. A pneumatically operated two-station fixture holds the workpiece. Operation of the machine is continuous, the operator loading one piece while the opposite piece is being milled resulting in minimum idle cutter time.

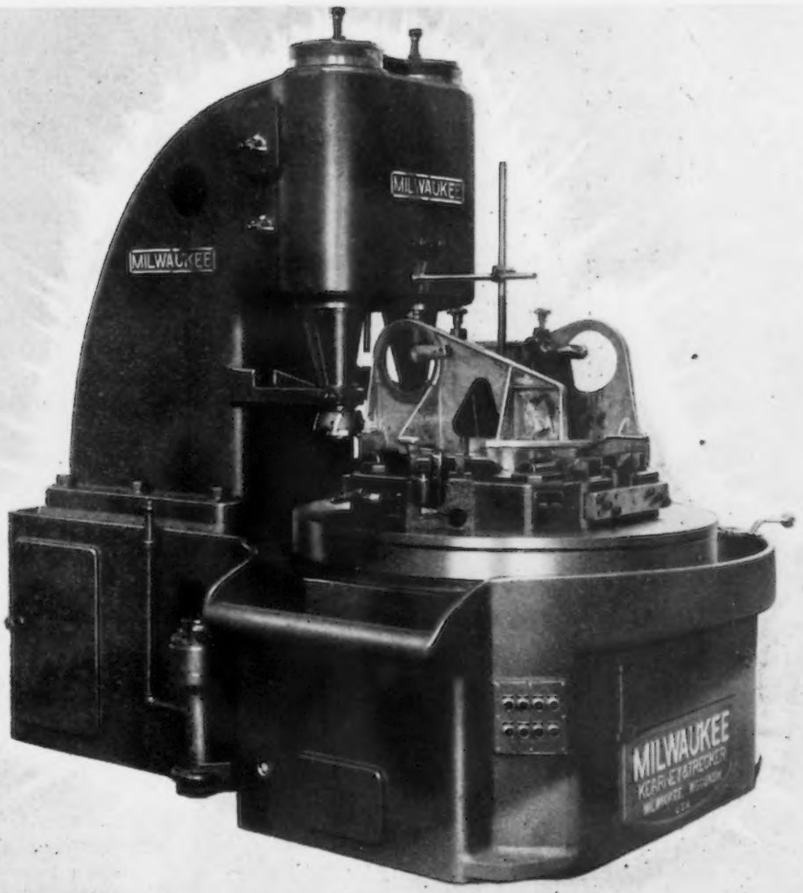
Rough and Finish

MILLING ··

OF THREE SURFACES
IN A CONTINUOUS "ONE-MACHINE" OPERATION

EIS

KEARNEY & TRECKER CORPORATI



THE MACHINE: Kearney & Trecker Vertical Spindle Rotary Table Milling Machine — expressly designed for this mass production operation.

The two-spindle upright on this machine is mounted on sliding ways for lateral adjustment. Each vertical spindle is driven by a 5 hp motor and is quill-mounted to facilitate cutter location. A 3 hp motor drives the 48-inch rotary table. Rate of table movement is controlled by trip dogs in the T-slot on the table periphery, providing both feed and rapid traverse movement at any setting.

The specially designed Vertical Spindle Rotary Table Milling Machine is another example of many special machine tool problems solved by the Engineering Investigation Service of Kearney & Trecker Corporation.

"Engineering Investigation Service" studies your specific production problems and makes recommendations for the necesary equipment. This equipment may be a special machine, a special attachment for a standard machine, a special workholding fixture, or special cutters.

Of vital importance to the user of Kearney & Trecker Engineering Investigation Service is the background of 40 years experience of the Kearney & Trecker organization in the designing and building of precision, high-speed production machine tools.

T I 0 lwaukee 14, Wisconsin

Wage Price Questions

(CONTINUED FROM PAGE 114)

creases.

These blanket approvals do not cover increases in the building and construction industry and other classes of cases in which no increase is lawful without specific approval.

Question: Will a separate application for approval have to be filed with the appropriate agency for every wage or salary increase not falling within one of the classes which has been given advance approval?

Answer: Yes, if the employer wishes to use it as a basis for seeking an increase in price or rent ceilings or utility rates or for increasing costs to the United States under a government contract.

Question: Does the new pattern standard mean that any wage increase up to 18½¢ an hr, or some similar figure, will be approved?

Answer: No, the Executive Order does not proceed upon the basis that any nation-wide pattern of wage or salary increases has been established by recent wage settlements. The patterns which it recognizes are patterns for particular industries, or for related industries within a particular labor-market area. These patterns vary from industry to industry and from locality to locality.

Question: How does the new cost-of-living standard differ from the cost-of-living standard in the previous Executive Order?

Answer: Under the previous Executive Order increases were approved only to the extent that the increase in average straight-time hourly earnings in the appropriate unit since Jan. 1, 1941, had fallen short of 33 pct. The new Executive Order provides for approval of increases in basic wage or salary rates if hourly rates in the appropriate unit have not risen 33 pct since Jan. 1, 1941. The application of this standard in the case of employees on other than hourly rates, such as piecework, will be worked out by the National Wage Stabilization Board on a case-by-case basis.

Price Adjustments

Question: May OPA advise an

(CONTINUED ON PAGE 138)

POWER *made possible* by ALLOY STEEL

The mighty crawler tractors that carve airports and highways out of wastelands are actually mobile power plants. And these power units are made possible by alloy steel! Only alloy steels have the qualities of strength and resistance to wear necessary for the rugged existence of a crawler tractor and alloy steels permit the elimination of excess bulk and weight.

Many vital parts of these powerful monsters are built of Wisconsin Alloy Steels. These alloy steels have proven their quality in thousands of applications. Better control, fewer rejections, finer steel, are more than slogans to Wisconsin Steelmen. They are the very foundation of Wisconsin steelmaking tradition.

Contact Wisconsin's sales and metallurgical staffs for the facts you need about alloy steel applications. You'll get the benefit of top-flight steelmaking "know-how," because the name "Wisconsin" means excellence in alloy steel.

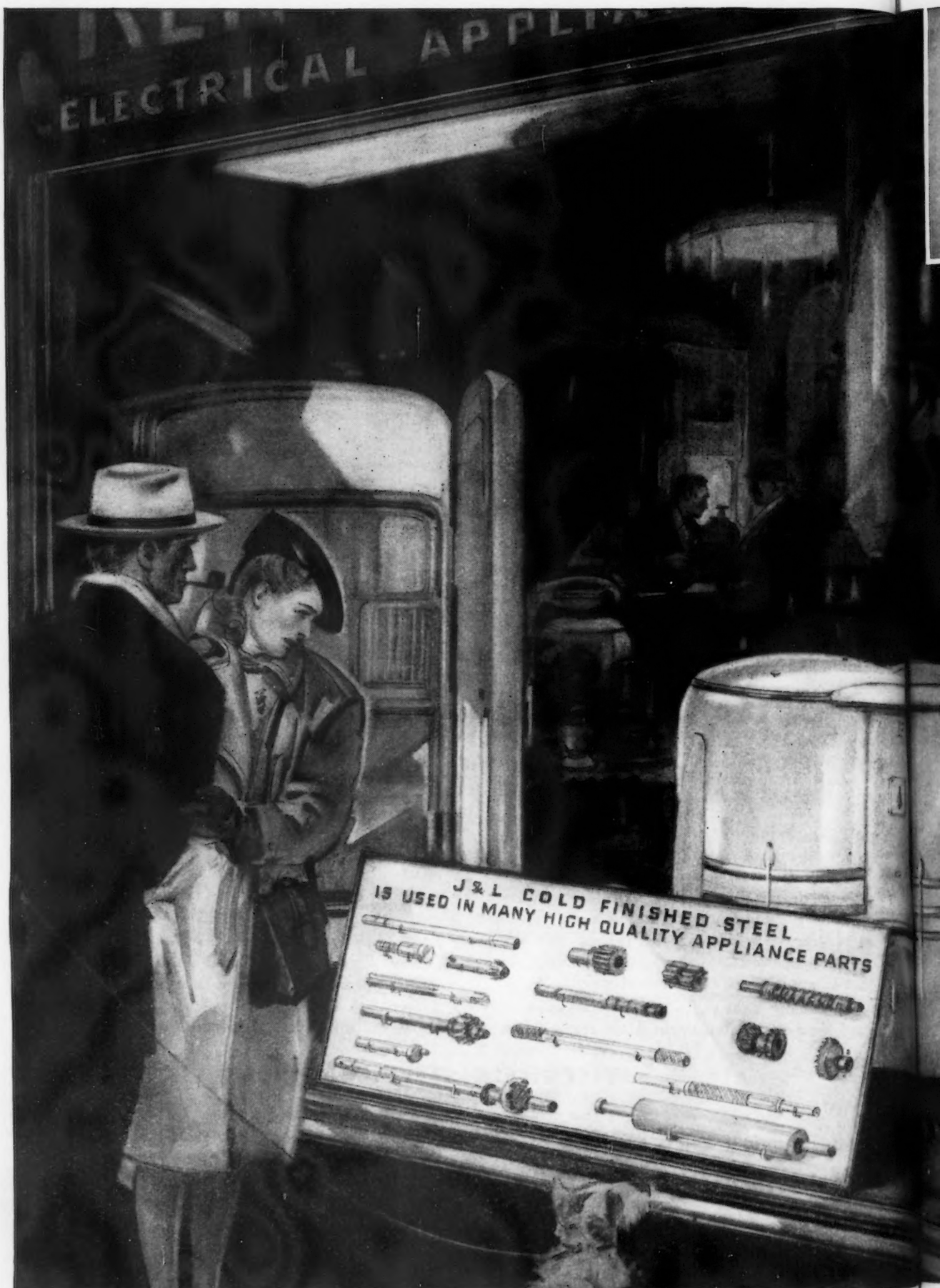
WISCONSIN STEEL COMPANY

(Affiliate of International Harvester Co.)

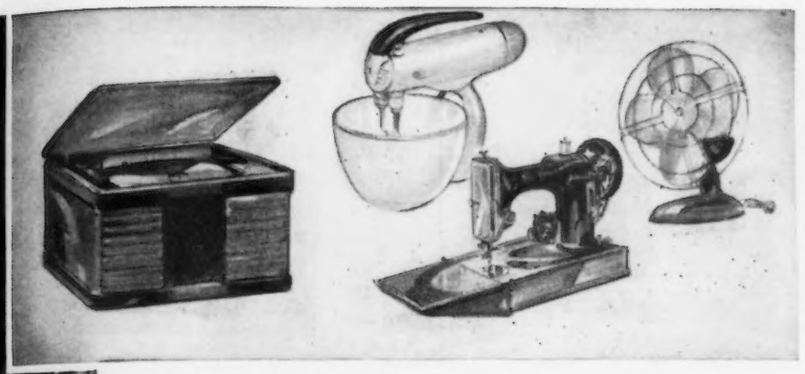
180 North Michigan Avenue Chicago 1, Illinois

STEEL OF SUPERB QUALITY

WISCONSIN ALLOY STEELS



DRAWN FOR JONES & LAUGHLIN STEEL CORPORATION BY ORISON MACPHERSON



J&L COLD FINISHED— THE STEEL OF HOUSEHOLD MAGIC

The magic that comes into your home today with the new refrigerator, new range, new washer, new sewing machine to take the drudgery of housework out of your hands is greatly due to new steels.

Many of the newly-designed household appliances stem from devices developed during the war, when steel was altered to permit radical changes in design and development of new manufacturing techniques. Metallurgists, design engineers and machine tool builders, intent upon victory, found the means of producing parts by the thousands with greater precision than previous methods permitted.

Since the war, these same men have applied their skill, knowledge and ingenuity to serving you in your daily life. They have devised machines to do your bidding at home, at work, at play . . . new, intricate machines, wonderfully constructed, yet simple to operate. Many of these appliances contain parts of J&L Controlled Quality Cold Finished steel.

In production of cold finished steel, Jones & Laughlin's years of experience and skill—plus rigid control of every step enables many manufacturers to bring you many new appliances of household magic that work quietly, efficiently, economically to give you better living and more time to enjoy it.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

LIGHTER, STRONGER, CONTROLLED QUALITY STEELS

HOME APPLIANCES

Your new kitchen range has been designed to give you maximum efficiency. Combined features include new smokeless broilers and grills high enough to work at without stooping, deep well cookers, oven timers, automatic lighting of top burners, simmer flames, separate ovens for baking cakes and roasting meats, oven lights, plate warming racks, towel racks, cutlery and utensil drawers, cereal storage, lighted working surface, electric outlet for percolator, or waffle iron, safety lock on oven valve and automatic stop on oven door. Many range parts are made of J&L Cold Finished bars and special shapes.

Your new electric kitchen sink will contain an automatic dishwasher. It will clean dishes, pots and pans with high-velocity jets of soapy water, then rinse and dry them. Some of the sinks contain garbage disposal unit that grinds table waste, washes it down drain, then scalds itself clean. No more messy garbage to "take out," no more dishpan hands, when you use this sink, many parts of which are made of J&L Cold Finished Steel bars and special shapes.

Your new refrigerator will have many of following features as result of improved design and production technique. Large freezing locker, shelves in door, sealed-in refrigerating unit, better insulation, adjustable and sliding shelves, ice cube releases, more ice cubes, a lamp to retard bacteria growth, larger vegetable crispers, compartment for keeping butter at spreading consistency, separate cold zones, a clock for night defrosting or models that require no defrosting. None will have all these features but all will have improved moving parts, many of them made of J&L Cold Finished bars and special shapes.

Your new sewing machine will have several improvements designed to make your sewing easier, give your dresses, your children's clothes, drapes, and slip covers that "professional" look. The new cabinets are available in period or modern styles to match your furniture. One portable model weighs only eleven pounds. Several important parts of sewing machines are made of J&L Cold Finished bars and special shapes.

Your new washer has been given a great deal of time and study by design engineers to produce the best in both automatic and conventional type machines. With an automatic you put in clothes, set dials, add soap. The washer fills itself, tumbles clothes clean, rinses them thoroughly, spins them dry, then cleans itself, empties and shuts off. It can be installed in kitchen with clothes drier to match. New conventional washers have improved wringer controls, others spin clothes dry, one can be converted into dishwasher. Many parts of washers are of improved J&L Cold Finished bars and special shapes.

(CONTINUED FROM PAGE 134)

employer who is engaged in wage negotiations what price increase he might be entitled to if he should make a certain wage increase and secure approval of it?

Answer: No. If OPA is to achieve its objective of speeding production wherever this can be done by prompt and fair price adjustments, OPA must not become entangled in wage negotiations.

Question: Would the answer to the above question be different if the employer had agreed to a particular wage increase, but had not yet secured approval of it?

Answer: No. However, pending approval of a wage increase for which application has been made, an employer or his industry can present the facts to OPA, and OPA can then take steps to expedite action on the application as soon as the wage increase has been approved.

Question: If an employer has made an approved wage increase or has applied to a wage stabilization agency for approval, how should he apply for a price increase?

Answer: If he belongs to an industry for which an OPA industry advisory committee has been organized—and most industries have them—he should bring his case to the attention of that committee. The committee will then consult with OPA if there appears to be ground for an industrywide price increase.

Question: What should an employer do who does not belong to an industry which has an industry advisory committee?

Answer: He may write to OPA, requesting consideration of an increase in the ceilings of the products which his industry makes.

Question: Does the fact that an employer has made an approved wage increase assure him that he will secure a price increase?

Answer: No. Many employers will require no price increase whatever. OPA has always expected manufacturers, wholesalers and retailers to absorb cost increases to the extent of their capacity to do so without assuming an unreasonable burden. Without such cost absorption, effective price control would be impossible, since every price increase would lead to a succession of further in-

creases, thereby setting the inflationary cost-price spiral in motion.

Question: How does OPA determine whether an employer is reasonably able to absorb an approved wage increase without a price increase?

Answer: OPA has developed standards to determine when prices must be increased as a consequence of cost increases or other developments which decrease earnings. These standards are generally applied on an industry basis. However, the regulations covering many commodities also authorize individual seller adjustments.

Question: Will federal procurement take account of approved wage or salary increases made after Feb. 14, 1946?

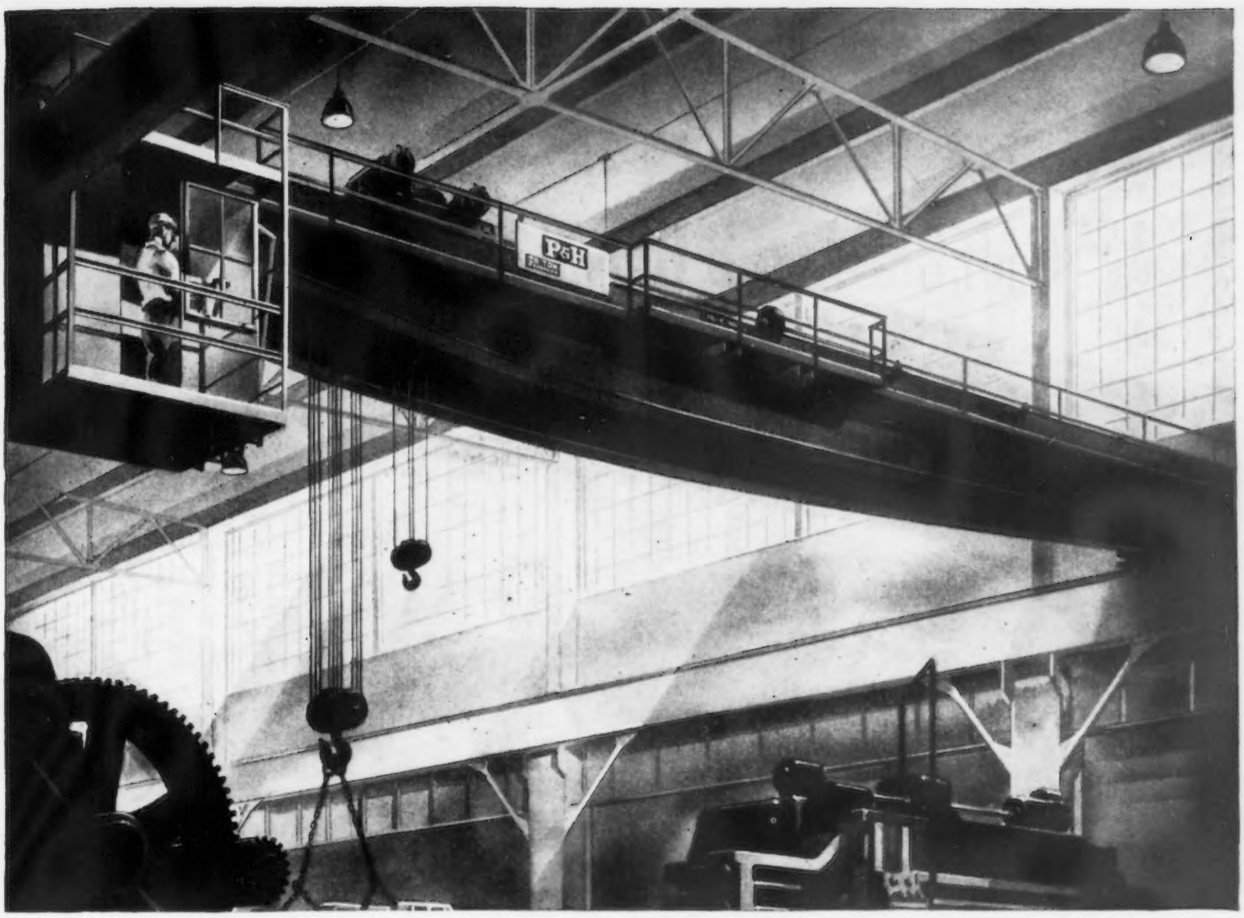
Answer: Yes. Any approved wage or salary increases made on or after Feb. 14, 1946 (the date of the new Executive order), by an employer furnishing goods or services under contract with the United States will be taken into consideration by the procurement agency concerned on the same basis that the agency would take any other cost factor into account.

Question: May an employer make a wage or salary increase and then apply for approval?

Answer: In two classes of cases, yes. In others, no. The first class of cases is one established by an earlier order of the Stabilization Administrator. For an interim period, until Mar. 15, 1946, an employer may make an unapproved wage or salary increase without waiving the right to seek approval afterward. He must, however, apply for such approval within 30 days after the increase is first reflected in current payrolls.

The new regulations provide for a second class of cases in which approval of a wage or salary increase may be sought after it has been made. An employer need not secure prior approval of a wage or salary increase if he has no present intention of using it as a basis for seeking an increase in price or rent ceilings or utility rates or for increasing costs under a government contract, and if he so states in a notice describing the increase filed with the appropriate wage or salary stabilization agency within 30 days after the in-

(CONTINUED ON PAGE 142)



Another added Crane Value

Eliminates Cover Plate Breakage

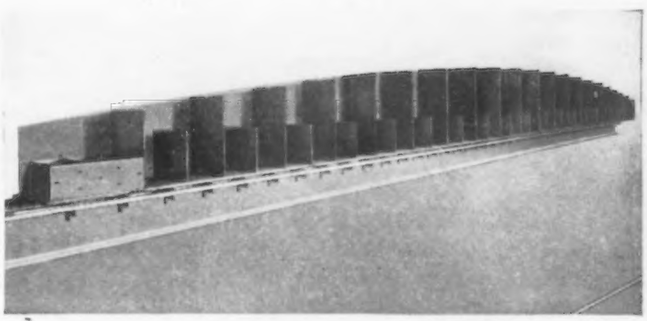
P&H's modern crane design provides greater over-all strength by utilizing materials to better advantage.

In P&H's husky all-welded box section girder, the cover plate is welded integral with supporting diaphragms. These diaphragms therefore, support the top plate throughout, transferring trolley wheel loads directly to the web plates.

With this construction, there is nothing to work loose or to weaken . . . cover plate breakage is eliminated. And, the girder is stronger and stiffer, with greater resistance to all kinds of stresses and strains.

Total over-all weight is also reduced by P&H's fishbelly girder design. This results in reduced loads both on truck wheels and on crane runway structures.

Before you buy your next electric crane, check into these and the other P&H added crane values. On any crane problem, consult P&H — America's leading crane builders.



As shown above, the P&H crane girder is welded in upside-down position. Note the alternating full depth diaphragms hand welded to the cover and web plates. This assures uniform distribution of trolley wheel loads, greater rigidity and freedom from the usual structural maintenance troubles.

P&H

ELECTRIC OVERHEAD CRANES

4401 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

ELECTRIC CRANES • EXCAVATORS • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

crease is first reflected in current payrolls.

If the employer files such a notice, he can ask for approval of the increase at any later time. Approval will be given or withheld on the same basis as if it had been sought before the increase.

If an employer makes an unapproved wage or salary increase on or after Mar. 15, 1946, and fails to file such a notice, he will be deemed to have waived any right to use the increase as a basis for seeking price increases, or for any of the other purposes stated above.

Maritime Commission Recovers 70 Pct On Diesel Engine Sales

Washington

• • • **Export and domestic** sales of more than $12,500,000 worth of surplus marine diesel engines at an approximate over-all recovery rate of 70 pct, has been reported by the Materials Disposal Section of the Maritime Commission. Monthly average sales were said to amount to $1,000,000. Cooperating with the Commission in disposing of the engines are diesel engine manufacturers. Purchases are being made by ship owners, manufacturers, engine dealers and exporters.

The present surplus stock of marine diesel engines is approximately $6,500,000. These engines range in size from 90 hp to 1000 hp and are priced from $1725 to $40,000 each with nearly all nationally known makes represented.

Although these engines were primarily designed for marine use, it was pointed out, they are easily adaptable for use as stationary engines, for the operation of power plants, pumping stations, or auxiliary field units.

The engines are located throughout the United States and permission to inspect, along with specific locations, may be obtained by writing or contacting the Materials Disposal Section, U. S. Maritime Commission, Washington 25, D. C., or the Maritime Commission's Settlement Section offices at the following locations: 1015 Chestnut St., Philadelphia 7; 310 S. Michigan Ave., Chicago 4; 348 Baronne St., New Orleans 12; 14th and Franklin Sts., Oakland 12, Calif.; 39 Broadway, New York City.

You'll get a quick answer when you use this new Frasse data chart. With it you can compare—at a glance—the physical properties of 16 different stainless grades. Makes it easy to select the type *best* suited to your application.

In full color—and in quick graphic style—this new Frasse chart compares nine important stainless factors — tensile strength, yield, izod, creep, machinability, scaling resistance, thermal conductivity . . . and relative cost. For additional selectivity, a comparative corrosion resistance table is included on the reverse side.

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Please send me without obligation, a copy of the new FRASSE Data Chart Section A, No. 4.

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Whether you want to review your present stainless picture . . . or to find the right grade for a new use—you'll find this Frasse chart invaluable in your stainless planning, production and purchasing. Send for your free copy today. *Peter A. Frasse and Co., Inc., 17 Grand St., New York 13, N. Y. (Walker 5-2200) 3911 Wissahickon Ave., Philadelphia 29, Pa. (Radcliff 7100) 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) Jersey City Hartford • Rochester • Syracuse • Baltimore*

FRASSE MECHANICAL STEELS AND TUBING

Alloy, Stainless and Cold Finished Carbon Steels
Bars • Tubes • Sheets
Strip • Wire

Gregory Stresses Need To Speed Up Surplus Disposal Techniques

Washington

• • • **Speed-up of disposal** of war surpluses through simplified administration, direct attacks on existing bottlenecks, and broader regional authority is the objective of the War Assets Administration, Lt. Gen. Edmund B. Gregory, chairman, has advised the Senate Military Affairs Committee.

In a progress report to the subcommittee on Surplus Property recently, the general declared that rapid liquidation is necessary, not alone because property is becoming surplus much faster than it is being sold but because the present favorable market for such material cannot be expected to last longer than a year.

Surplus property within the United States now totals nearly $6.5 billion in inventory, not including more than $3 billion in non-salable aircraft. Between now and July 1947, it is anticipated that roughly $27 billion of property will have become surplus domestically (the WAC has no jurisdiction over surplus located overseas. So far, about $3 billion has been liquidated.

Great progress was made in administration when domestic surplus disposal, once handled by five major agencies, was largely centralized within the WAC. Studies are well advanced, General Gregory said, looking toward eliminating duplication of services, bringing policy and ground operations closer together, and cleaning out of bottlenecks.

Chief among the bottlenecks is the tremendous amount of paperwork. This will be slashed wherever it can be cut without injuring essential business records, General Gregory said. Such a reform could be expected from the man who, as the Quartermaster General of the Army, once eliminated over 400 forms and reports and nearly 5000 procedures, saving his organization 155,000 manhours per month.

In addition, steps have been taken to obtain "more sales-minded descriptions" on the declaration reports and to speed inspection reports by placing addi-

tional qualified inspectors in the field.

Insufficient authority for the field offices to sell items valued at $25,000 or more without referring to Washington for programming and approval has further hindered disposal. In many instances, inventories are composed of items where the total value of each group is under the $25,000 limit; to get such inventory on a national sales program through Washington headquarters requires 59 working days. The general's answer was to increase direct sales responsibility of the field offices to $500,000, reserving to Washington only the authority to approve unit prices.

A "look-buy" or on-the-spot sales procedure has been inaugurated in order to move large masses of property located at one place. Sample rooms are rigged which show price-tagged merchandise; catalogs are furnished potential customers. All property at such sales is offered at the same wholesale price, the buyer paying on the spot and providing his own transport. Much administrative paper-work thus is eliminated and with few exceptions transactions are completed in 30 min or less.

At least 21 such sales have been scheduled at Army, Navy and RFC depots or warehouses all over the country. Similarly, 47 more have been planned for Air Forces depots where the items are chiefly aircraft components and parts.

Further Clarifies Symbol

Washington

• • • **Use of the** symbol CXS (certified export steel) in obtaining preferential treatment for export purchase orders on limited quantities of selected steel products is further clarified in Direction 10, General Preference Order M-21, issued by CPA. In addition to the symbol exporters authorized to use it also should specify the period in which the shipment has been designated and include a signed statement to the effect that the products ordered are within the quantity authorized by the Office of International Trade. Authority to use the symbol is obtained from the Steel Section, OIT, Commerce Department.

Gallup Polls

(CONTINUED FROM PAGE 105)

were revealed in questioning of typical families from coast to coast. Most living cost indexes are based on the prices of commodities that people need; today's index is based on direct evidence of what people say they actually spend for food.

The question in the survey was:

"On the average, how much does your family spend on food, including milk, each week now?"

The results, excluding farmers

	Pct
$5 or less	4
$6-$10	19
$11-$15	25
$16-$20	24
$21-$25	14
More than $25	14
Median average	17

Farmers say that, on the average, they spend $10 a week.

Families living in large cities pay out considerably more for food than those in small towns.

The average expenditures for food today by size of town are shown below.

	Weekly food expenditure
Farmers	$10
Towns under 10,000	15
Towns 10,000-100,000	15
100,000 and over	20

There are also differences by occupation groups, as follows:

Professional and business	$20
White collar	18
Manual workers	15

Pig Iron Firm Reports Profit Drop of 45 Pct

Birmingham

• • • **In addition to** improvements in its ore mining and pig iron smelting facilities whch took $538,010 in 1945, the Sloss-Sheffield Steel & Iron Corp. plans to implement its by-products utilization program, especially in the use of slag wool for insulation and a 6 pct DDT solution carried in xylol, a by-product of the coking of coal. Another by-product of coke is being used in making aluminum paint.

Company earnings for the year, after deducting $869,724 for depreciation and depletion were $361,976 compared with $668,142 for the preceding year. Gross sales and operating revenues, less discounts and allowances, for the year amounted to $16,473,849, compared with $17,594,365 in 1944.

Information Free

(1) Porcelain Plungers:

Six-page illustrated data sheet completely describes Kosmos porcelain plungers which can be used on almost any hydraulic pump up to 2000 psi. Data sheets give complete construction details, specifications, types of service and purchasing information. *Aldrich Pump Co.*

(2) Movies and Industry:

Booklet entitled "Movies Go to Work" gives industry the reasons for adopting motion pictures as a management tool by showing an up-to-the-minute general picture of the importance of sound films to industry's future. *Bell & Howell Co.*

(3) Thread Inserts:

Folder describes a practical solution to a difficult problem in the design of products made of light metals and plastics. It contains data on the Heli-Coil screw thread inserts and the Heri-Thread screw thread system. *Aircraft Screw Products Co., Inc.*

(4) Control System:

Data sheet describes the Viking type R-18 safety control system for the shutdown of diesel engines when oil or cooling systems break down and contains information on operation, installation and operating instructions. *Viking Instruments, Inc.*

(5) Silver Brazing:

The Silbraz Joint is described in a 16-page booklet, which shows how the joints are made for brazing, how they resist corrosion and vibration, simplify and speed up installation and other advantages. *Air Reduction Sales Co.*

(6) Welded Fabrication:

New engineering manual discusses the factors affecting the choice of welded fabrication and techniques of welded design. Various types of welds are explained and how they affect static and fatigue load values is told. *United Welding Co.*

(7) Speed Indicators:

Illustrated bulletin describes several models of tachometers designed for industrial rpm or surface speed measurements. Units for both permanent installations and portable applications are catalogued and list prices shown. *Chicago Electric Tachometer Co.*

(8) Maintenance Paint:

Complete information on Pen-Kote chemical resistant maintenance paint is given in this bulletin. Illustrations of typical jobs show how this coating can be applied to heated, wet or porous surfaces. *Peninsular Chemical Products Co.*

(9) Single-Stage Pumps:

Design, construction and engineering details of Cameron single-stage general service pumps are given in this catalog. Units are designed for capacities to 25,000 gpm, against heads up to 300 ft., and are available in several combinations of metals for a wide variety of liquids. *Ingersoll-Rand Co.*

(10) Hydraulic Cylinders:

Catalog describes standard Rotocast hydraulic cylinders and contains engineering data. Dimensional stability of the centrifugally-cast bore, automotive-type piston rings, end covers attached without tie rods, seals which eliminate gaskets are among features described. *Logansport Machine Co., Inc.*

(11) Molten Metal Filter:

The Briggs Filterscreen, a metal screen covered with a special ceramic coating, through which molten non-ferrous metal is poured into the mold, is fully described in this folder. The screen will resist extreme heat shock of molten metal at pouring temperatures up to 2500° F. *Briggs Clarifier Co.*

(12) Drill Chucks:

Complete with diagrammatic drawings and cutaways, this circular gives construction details, special applications and size ranges on Wahlstrom fully automatic drill chucks and automatic tapping attachments. *American Machine & Foundry Co.*

(13) Machine Shop Terms:

This glossary will be of practical aid to buyers and users of machined forgings. Words and terms are defined as used in heavy machine shop practice. *Kropp Forge Co.*

(14) Thermocouple Data:

New edition of thermocouple data book and catalog, gives information on selection of proper thermocouples and carries installation aids. Auxiliary items are described and list prices given. *Wheelco Instruments Co.*

(15) Steam Turbine Lubrication:

Operating characteristics and advantages of Gulfcrest oil for steam turbine lubrication are described in this booklet. Included is a picture story of the Alchlor process of refining which makes this lubricant responsive to oxidation and corrosion inhibitors. *Gulf Oil Corp.*

(16) Key Kit:

All of the bits used with the tool described in this folder are held safely in the plastic handle and provides tools for driving socket set and cap, Phillips and slotted head screws. One application of the swivel chuck permits direct driving and leverage for tightening up is obtained by simply snapping the chuck to the desired position. *Standard Pressed Steel Co.*

(17) Unichrome Dip:

Folder gives complete information on the Unichrome dip process for obtaining corrosion for zinc and cadmium by dipping. Process produces either a black or olive drab finish. Work requires a single immersion in the dip for 2 to 5 min. *United Chromium, Inc.*

(18) Die Steels:

Wall chart gives available sizes of hollow die steels carried in stock in sizes from 3 to 6 ft lengths. Heat treat procedures are also listed. *A. Milne & Co.*

(19) Gages:

Products and services developed by the firm are shown in illustrated bulletin. Pictures show special, built-up gages and fixtures of a wide variety of types available. *AA Gage Co.*

NOTICE TO READERS: Your request for this information will be forwarded promptly to the manufacturer issuing the literature. The offer is good for only two months.

THE IRON AGE, New York 17, N. Y. 3/21/46

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INFORMATION FREE (Continued)

(20) Technical Definitions:

Circular contains list of definitions applying to the steel industry and also shows size gages in millimeters and inches. Primarily published for use abroad. *Mercantile Metal & Ore Corp.*

(21) Coal Thawing Pits:

Anyone receiving frozen coal in hopper cars during the winter will be interested in this folder on thawing pits. Indirect radiant heating method provided by the system described avoids damage to car hoppers and other equipment as there is no direct flame blast or impingement on structural parts. *Hauck Mfg. Co.*

(22) Precision Castings:

Origin and development of the Microcast process, together with the range and type of precision castings produced, and their applications, are shown in this booklet. New casting technique produces small parts to close tolerances with little or no machining. *Austenal Laboratories, Inc.*

(23) Power Units:

Bulletin pictures and gives engineering data on the application of power units, originally applied to aircraft, to many other types of equipment. These units are engineered to actuate linear or rotary motion. Some are designed with built-in motors, others are actuated by direct drive or by flexible shaft. *Foote Bros. Gear & Machine Corp.*

(24) Safety Material:

A series of safety messages, prepared to impress workers with the danger and costliness of accidents, is offered. Reminders are in a size convenient to slip into a pay envelope. *Hy-Test Div., International Shoe Co.*

(25) Roto Shaving:

Two new bulletins, one on production of involute splines and the other on roto shaving, are available. Booklets give complete descriptions and specifications. *National Broach & Machine Co.*

(26) Vibration Testing:

Vibration testing expedites new designs by shaking out the faults without protracted field tests. Descriptions and specifications of the RV3 vibration table, type VU-DM-500 and the three dimensional test stand VU-DM-100 is given in the booklet. *L. A. B. Corp.*

(27) Hydride Process:

Booklet describes purpose and application of the Hydride process and gives detailed data on the properties of metallic hydrides, titanium, titanizing, zirconium, titanium-copper alloys, zirconium-copper alloys, special metals and powdered alloys. *Metal Hydrides, Inc.*

(28) Fork Truck:

Folder outlines new features of the electric Palletier industrial fork truck. Model MGVH, which include a completely welded unit with carriage rollers mounted on 10 Torrington needle bearings, hand-forged forks, one-piece combination driving axle and driving disc bolted to wheels. Capacities are 3000 lb and 4000 lb. All electric controls are located on a single panel. *Crescent Truck Co.*

(29) Center Drill:

HY-CO center drills, precision made of highspeed steel, described in bulletin. The Sphere-O-Form contour of the drills furnishes increased cross-sectional area in a steadily increasing rate, following practically the increase in torque load. Booklet contains complete information on the drills along with dimensions and prices. *Howard H. Heinz, Inc.*

(30) Quenching Press:

Booklet fully describes the new No. 16 quenching press, equipped with a built-in pumping system and oil reservoir, reducing the external oil supply to only 35 gal. All stages of the quenching operation are automatically set by controls placed at front of machine. *Gleason Works.*

(31) Fire Safeguard:

The type F18T flame failure safeguard, designed to protect commercial and industrial oil burning equipment is covered in this folder. Data on the company's boiler feedwater control is contained in another folder. *Combustion Control Corp.*

(32) Building Maintenance:

Handbook contains discussion of materials and methods which have recently been developed in building maintenance work, all classified for ready reference with instructions, advantages and recommendations. *Flexrock Co.*

(33) Review:

Booklet, generously illustrated graphically tells the story of the role "Enduro" stainless and heat resistant steels played in the war effort. It emphasizes how these wartime applications can be readily translated into peacetime terms. *Republic Steel Corp.*

(34) Demineralizers:

The process of preparing clear water by ion exchange is described in this new bulletin. The process is told in simple language, accompanied by illustrations and chemical reactions of the ion exchange process. *Cochrane Corp.*

(35) Coal-Coke Buckets:

Full details of the class E-15 Hayward grab bucket which is able to dig or re-handle one lb of coal or coke for each lb of bucket weight, are given in this folder. Illustrations and a chart of bucket load capacities, weights and dimensions are included. *Hayward Co.*

(36) Tubing Data:

Ostlind column charts for alloy aircraft tubing, with the explanation on their use and the internal pressures on stainless steel tubing for hydraulic lines, are given in this supplement to Section III of company's tubing data book. *Summerill Tubing Co.*

(37) Cutting Fluids:

Pocket-size booklet contains information for users of water mixed cutting fluids. Among the features covered are cutting fluids and hygiene and design data for cutting fluid systems, with accompanying charts. *D. A. Stuart Oil Co., Ltd.*

(38) Automatic Clutch:

Bulletin describes the company's new automatic clutch for operating loads up to 6 hp. The clutch is said to operate smoothly, absorb momentary overload, eliminate starting shock and to arrive quickly at driving speed. *Salsbury Motors, Inc.*

(39) Glass Equipment:

Catalog contains information on the company's glass beveling, grinding, cutting and conveying equipment. Eighteen machines are illustrated, including a tungsten carbide shaping machine. *G. W. Klages & Son, Inc.*

(40) Rotameters:

Bulletin gives the advantages of Rotameter, low rate indicating, recording, controlling and totalizing meters. Engineering recommendations for various types of Rotameters, details of the master enclosed Rotameter, armored Rotameter, laboratory Rotameters are covered. *Fischer & Porter Co.*

(41) Stainless Steel Fabricating:

Bulletin on stainless steel fabricating covers many types of stainless items fabricated for various industries, together with a table of standard type numbers and analyses. *Alloy Mfg. Co., Inc.*

(42) Aluminum Alloy:

Alicast aluminum alloy, a high quality, general purpose aluminum alloy, is described in this bulletin. Also given is its history, principal advantages, mechanical properties and recommended applications and properties in sand and permanent mold casting forms. *National Smelting Co.*

3/21/46

THE IRON AGE, New York 17, N. Y.

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Surplus Government Equipment Controlled

Washington

• • • **Additional classes of** industrial equipment in government surplus have been brought under the fixed price disposal formula, which heretofore has applied only to machine tools, War Assets Corp. has announced.

This formula, usually called the "Clayton Formula," sets depreciation pricing rates for surplus industrial equipment according to the length of active use. Testing and measuring machines, surfacing machines, internal combustion engines, and certain types of woodworking machinery (including sawmills), generators, and compressors and pumps are examples of the types of surplus machines now included in the extended price formula.

The action is taken in revised WAC Regulation No. 13 and applies to the continental U. S.

In addition, by other provisions of the revised regulation, two classes of industrial equipment in government surplus and commercially unsalable are to be disposed of as scrap after salvageable components have been removed. The War Assets Corp. has declared all surplus machine tools and machines with more than 25 years of active life to be commercially unsalable and to be disposed of as scrap.

At the same time, a master list is being established which identifies certain types of surplus industrial equipment originally made for specialized war production work. Surplus items on this master list are also classed as commercially unsalable and will be disposed of as scrap.

Provision is made for the donation of commercially unsalable machines and industrial equipment to tax exempt, nonprofit educational and charitable institutions eligible to receive donations of surplus property.

The already existing 5 pct discount from fixed price, offered purchasers of surplus industrial equipment who do not own the plants in which the equipment is located at the time of sale, continues in effect for all classes of surplus industrial equipment under the enlarged price schedule.

Allegheny Ludlum Plans Export Market Expansion

Pittsburgh

• • • **Allegheny Ludlum** Steel Corp. has completed arrangements with Airco Export Corp., subsidiary of Air Reduction Co., for worldwide sales representation on an exclusive basis for its stainless steel products, electrical steels and alloys. Russell M. Allen, sales vice-president, said. "This step is based on long range plans by the company to expand its export sales, and is taken at this time to meet the heavy demand for American products, particularly in Europe and South America. The U.S.S.R. and Canada are not included in these arrangements."

Export sales facilities have already been established by Airco in all countries open to private trade for marketing of the products of its parent and subsidiary companies. According to company officials, the plans and preparations for a greatly expanded setup for export sales indicate considerable optimism for the future.

Sharon Steel Earnings Remain at 1944 Level

Sharon, Pa.

• • • **When the operation** of the Farrell Works, acquired by Sharon Steel Corp. on Dec. 15, 1945, is thoroughly coordinated with Sharon's finishing mills, the company plans to dispose of its steel plant and blast furnace at Lowellville, Henry Roemer, chairman and president, announced in his annual report to shareholders.

Consolidated new profit for 1945 for the company and its subsidiaries, Niles Rolling Mill Co. and Detroit Seamless Steel Tubes Co., was $1,029,074. In 1944 the company earned $1,034,636. Consolidated new sales for the year were $40,602,577 for 459,776 tons shipped as compared with $35,335,389 for 453,057 shipped by Sharon Steel only during 1944. The increase in sales is principally due to the inclusion in 1945 of sales by the subsidiary companies.

Wages and salaries during the year amounted to $13,015,262. Total number of employees at Dec. 31, 1945, was 6069 including the 1661 employed in the Farrell plant from Dec. 16 to Dec. 31, 1945.

Australia Shuts Down Plants Built to Meet Wartime Stringencies

Melbourne, Australia

• • • **The importance of the** contribution made by the Australian steel industry to the war effort was stressed by H. C. Darling, chairman at the annual meeting of the Broken Hill Proprietary Co., Ltd., held in Melbourne.

During the years immediately preceding the outbreak of war, extensions and additions to plant brought Australia's steel ingot capacity to 2,000,000 tons a year. Never at any time during the war was Australia seriously short of steel, and large tonnages were made available to the United States forces and to Great Britain.

The company was associated also with the difficult task of producing special machinery, tools and gages essential for accurate mass production of munitions. Annexes were built at various centers, and these had turned out vast quantities of ammunition, including 250-lb high explosive and armor-piercing bombs, and armor-piercing and high explosive shell bodies. In addition, such requirements as gun barrels and components, ammunition links, field telephone cable, submarine nets, Bren gun components and steel helmets were manufactured by B.H.P.

Following the declaration of the European war, Australia soon found itself cut off from supplies of tungsten carbide, essential to the maintenance of a high rate of munitions manufacture. The company turned its attention to the possibility of its being produced locally, and its Newcastle organization developed a process for the manufacture of a suitable product in adequate quantities, despite a widespread belief that such an experiment, owing to lack of technical information and experience, would not prove successful.

Another technical triumph was bullet-proof steel plate. Australia did not have the alloys to make the conventional plate, but a substitute alloy was developed from a mineral found in the sea beaches of northern New South Wales. The bullet-proof plate produced by the use of this substitute alloy successfully met all ballistic specifications, had excellent weldability,

and enabled large tonnages to be produced by quick and simple methods with a considerable reduction in cost.

Mr. Darling announced that the electric steel furnace and the forge plant erected at Port Kembla early in the war period for the manufacture of gun barrels and other ordnance requirements, had been closed down. These plants materially helped to fulfil a major requirement in meeting the demand for gun barrels. Their capital cost had been borne by the company.

The establishment of the ferro-alloy plant at Newcastle provided almost every alloy essential for special steel making, and removed the serious difficulty of obtaining adequate supplies from overseas under war conditions. The magnesium plant, constructed in 1940-41 as a wartime project, fulfilled its purpose of supplying Australia's urgent war requirements of magnesium when imported supplies were unobtainable. The demand had now fallen to such an extent as to make magnesium manufacture by this unit uneconomical, and further production was at present unwarranted, said Mr. Darling.

The company's entry into the shipbuilding field comprised a major contribution towards Australia's war effort. They had built patrol vessels for the Navy, merchant vessels for the Australian Shipbuilding Board, two steamers for their own fleet to replace those lost by enemy action, barges at the rate of three per week for landing operations in the Southwest Pacific, and 75-ft ocean-going steel tugs for the United States forces at the rate of one every three weeks. This substantial shipbuilding program included the manufacture of marine propelling engines and large quantities of auxiliary equipment.

While the foregoing might be regarded as major undertakings, other items included the production of a much wider range of special alloy steels for the munitions program, airplane engine cylinder assemblies, the arming and degaussing of merchant steamers, the rendering of technical assistance to other industries, and the loan of technical personnel to the munitions and other government departments.

Continuing, Mr. Darling said that with a decline in the requirements of steel for defense purposes, business had declined somewhat, and could not be expected to improve until Commonwealth and state government undertakings and private enterprise changed over to peacetime requirements. At the same time, the orders that were on hand, combined with overseas orders for semi-finished steel, would keep the works busily occupied for some time ahead.

The South Australian iron ore mines operated throughout the year commensurate with the tonnage of shipping space available. It could now be recorded that 1,364,141 tons of iron ore were obtained from several small deposits in New South Wales. This was necessary on account of the shortage of shipping on the coast. Were it not for this ore, and also the heavy stocks of iron ore at Newcastle and Port Kembla when war broke out, Australia's steel requirements would have suffered severely. These deposits in New South Wales had now been closed, as they were uneconomical when compared with supplies from Whyalla.

B.H.P. Co. mining engineers had paid visits to New Caledonia for the purpose of inspecting iron ore deposits located on the island. As a result of these visits the company had taken certain options over a large area, and at the present time was testing the property to ascertain the quantity available and the suitability of the ore.

Until the coal position improved, it would not be possible to recommission the Whyalla blast furnace, which had been closed down for over a year. Certain improvements had been effected, and the plant kept in first-class condition.

Production at the Port Kembla works of Australian Iron & Steel, Ltd., had been adversely affected by shortages of coal and labor. Owing to the need for increased coke production at these works, it was decided to proceed with the construction of an additional battery of coke ovens, and work had

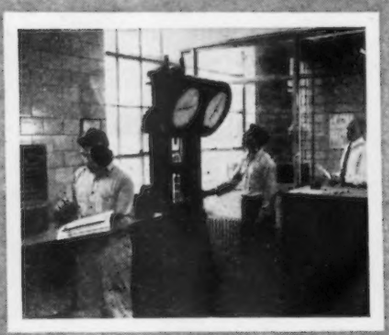
actually commenced. At the moment, however, construction had been suspended owing to the necessity for diverting labor elsewhere. Another major construction item, preliminary work for which was in hand at Kembla, was the installation of a new combination rod, bar and strip mill.

The developing and equipping of this company's ironstone deposits at Cockatoo Island, Yampi Sound, was actively proceeding, and it was desired to bring these leases into production at an early date. These ore deposits are low in manganese and eminently suitable for blending with the South Australian iron ore for steel making purposes, and as a national project would conserve mainland supplies. It was hoped that development might be sufficiently advanced by the end of 1946 to commence mining and shipment of ore to the steelworks. Previously, when equipping quarries of this nature, heavy machinery had been imported, but on this occasion its manufacture, including the large 84-in. by 60-in. crusher and the electric shovels, was being undertaken at the company's various workshops.

With a decrease in demands for material for defense purposes, it had been possible to divert a greater proportion of the Commonwealth Steel Company's production to commercial requirements. The demand for stainless steel polished sheets had exceeded capacity, and steps were in hand to install additional equipment to take care of this heavy demand.

Domestic requirements of railway wheels and tires had been met, and in addition it was possible to export a quantity of assembled wheels, tires and axles to India.

The wire mills of Rylands Bros. (Aust.) Pty., Ltd., and Lysaght Bros. & Co. Pty., Ltd., had been handicapped by a serious shortage of manpower in their efforts to supply fencing materials. These plants had the capacity to meet the whole of Australia's requirements, but until sufficient and suitable labor was made available there was no possibility of making the best use of the plant and equipment to afford relief for farmers. With the possibility in mind of the extension of the industry to Victoria, Rylands Bros. recently purchased some land at Geelong.



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Research and laboratory control has always played a vital part in Federated's operation, production and service. This new $100,000 laboratory, fully equipped with the most modern physical testing apparatus and spectrographic equipment, enhances our ability to control the quality of Federated aluminum, brass and bronze, babbitt, solder, type metal, die casting alloys and zinc dust and aid in the solution of our customers' problems.

The new laboratory at Whiting, Indiana, will render service to those located throughout the West. Our central research laboratory, located in Perth Amboy, New Jersey, will continue to handle the Company's general research program. Please feel free to avail yourselves of our facilities.

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